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POSTHUMOUS PAPERS

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NOTULÆ AD PLANTAS ASIATICAS.

Part III.

MONOCOTYLEDONOUS PLANTS.

BY THE LATE

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ARRANGED

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Surgeon, Bengal Service.

Calcutta:

PRINTED BY CHARLES A. SERRAO.

1851.

MISSOURI
BOTANICAL
GARDEN.

POSTHUMOUS PAPERS

OF THE LATE

WILLIAM GRIFFITH, F.L.S.

NOTULÆ AD PLANTAS ASIATICAS.

MONOCOTYLEDONOUS

PLANTS.

ERRATA.

Page 78 line 13 from top for denteculata, read *denticulata.*
,, 157 ,, for Accorus, read *Acorus.*
,, 163 ,, 7 from bottom for Pl. CCLIII, read *Pl. CCXLIII.*
,, 180 ,, 6 ,, top for ovarium, read *ovule.*
,, 204 ,, 2 ,, top for riglochin, read *Triglochin.*
,, 224 ,, 19 ,, bottom for paricum, read *parcum.*
,, 236 ,, 12 ,, bottom for Pl. CCXXII. Fig. II., read *Pl. CCLXXII. Fig. II.*
,, 245 ,, 11 ,, bottom for Pl. CCXXXII. Fig. II., read *Pl. CCLXXXII. Fig. II.*
,, 288 ,, 14 ,, bottom for littora, read *littoram.*
,, 304 ,, 10 ,, top for Pl. CCCI. read *Pl. CCII.*

ADDENDA.

Page 41 line 2 from top after Isachne geniculata, insert *Pl. CXLVIII. Fig. I.*

NOTULÆ AD PLANTAS ASIATICAS.

PART III.

Monocotyledonous Plants.

GRAMINEÆ.

13

ZIZANIA.

1. *Zizania? ciliata** *Spreng. Syst.* ii. p. 136. *Leersia ciliata.* Roxb. Pl. CXLIV. Fig. I. Zizania? Ciliata, Kunth Agr. 1, 10. Pharus ciliatus Retz. Obs. 5, p. 23.

Gramen in aquosis proveniens. Culmis gracilibus basi longe repentibus, lævibus, articulis cylindraceis pubescentibus exceptis. Folia, subglaucescentia linearia, acuta, supra lineata,

* With regard to this grass, we have Mr. Brown's authority (Prodr. Fl. Nov. Holl. ed Nees 1. p. 67, sub *Leptaspide*) for its being totally distinct from *Pharus,* to which it was originally referred by Retzius. Mr. Brown likewise points out (loc. cit.) that this and the succeeding, if not retainable in *Zizania,* will constitute a distinct genus. It will be seen that I have ventured to go farther, and I am only deterred from characterizing this as itself distinct, by the difficulty I find in distinguishing it from *Leersia,* with which genus I am only acquainted through M. Kunth's Agrostographia. Its obvious affinity is with *Oryza,* from the awnless varieties of which it only differs in the total absence of glumes; the presence of the membranous cup terminating the pedicel in *Oryza* proving, that it is not to be considered as a modification of these envelopes.

Potamochloa, *Griff.*

Syst. Linn. *Hexandria Digynia,* Order, Nat. *Gramineæ,* Juss. Spiculæ unifloræ. Glumæ nullæ. Paleæ 2 membranaceo-chartaceæ,

tactu scabra; margine subsimplici scabro. Spicæ paucæ distantes in paniculam nutanti alternatim dispositæ, subsecundæ. Flores solitarii, pedicellati, et articulati in apicem pedicelli curvati cyathiformem.

Glumæ o. nisi cupula membranacea annuliformi apicis pedicelli. Paleæ 2 (dextra sinistraque) chartacæ, carinatæ; compressæ, brevissime stipitatæ exterior 5 nervis; nervo medio (carina) et 2 marginalibus, denticulato-ciliatis, 2 lateralibus intermediis subglabris obtuse mucronata, mucrone setigero interior subobliqua, 3 nervis; carina denticulato-ciliata, nervis 2 lateralibus, glabris, apice mucronate setigera.

Lodiculæ 2, carnosæ, acinaciformes, secus marginem posticum vel interiorem rectæ; exteriorem convexæ. Stam. 6, antheris longe exsertis. Ovarium ovato-oblongum glabrum. Styli 2. Stigmata 2 plumosa, divisionibus ramosis, ratione stylorum longa.

Caryopsis.

a. Palea exterior 5 nervis. Pl. CXXXIX. Fig. 146.

b. Palea interior 3 nervis.

c. c. Lodiculæ 2.

d. Stamina.

e. Stigmata.

Legi in aquosis prope *Jumalpore,* eastern part of Bengal, *September* 18*th,* 1835.

Meo sensu glumarum defectu tantum differt ab Oryza, certe non Pharus et vix Zizania, vix congener Leersiæ aristatæ, Roxburghii Fl. Indica 2.

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2. Leersia cillaris Retz proxim an idem; Paleæ secus carinas ciliatæ, exterior margines secus hispidule cæterum glabra.

carinatæ, apertæ, exteriore in aristam productâ. Lodiculæ 2. Stamina 6. Styli 2. Stigmata plumosa.

Caryopsis.......

Gramen fluitans ope vaginarum cellulosarum, dense cæspitosum. Folia lata; ligula absoleta. Panicula effusa erecta; pedicelli infra medium constricti. *Journ. As. Soc. Beng.* 5, p. 571-1836.

Habitu magis elata; folia tactu scaberrima, nervo medio subtus retrorsi denticulata.

In aquosis proveniens inter *Nunklow* et *Nowgong* in collibus *Khasiensibus*, *Nov.* 18, 1835. *It. Ass.* 275.

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3. *Leersia aristata.** Roxb. Fl. Ind. Pl. CXL. Zizania? aristata Kunth Agr. p. 10.

Gramen in aquis stagnantibus natans. Culmis glabris, lævibus, *emersis vix pedalibus*, articulis cylindraceis pubes-

* Potamochloa Retzii. *Griff.*

Zizania? aristata. *Kunth Agr.* p. 10.

Leersia aristata. *Roxb. Flor. Ind.* 2. p. 207.

Pharus aristatus. *Retz. Obs.* 5, 23, *ex Kunth.*

Hab. In aquis stagnantibus prope *Jumalpore*, et copiosissime in inundatis, *Jheels* dictis, *Sylhet* confinibus. Legimus florentem Septembre, 1835.

Culmi emersi vix pedales, glabri. Immersi longissimi, hinc illinc radiculas capillaceo-divisas emittentes.

Vaginæ immersæ vel semi-immersæ quam maxime cellulosæ, incrassatæ et quasi inflatæ; emersæ longiores cylindraceæ, minus cellulosæ.

Folia in exemplaribus spontaneis semper emersa et erecta, lanceolata basi cordata, obtusa, apice sub-cucullata, rigida, suprà tactu scabra.

Panicula erecta, axi ad ejus originem subito angustatâ; rami infimi subverticillati, divaricati, superiores alternantes, ascendentes.

Spiculæ ramis adpressæ, subsecundæ, inferiores geminatæ, inæqualiter pedicellatæ, superiores solitariæ longius pedicellatæ.

Pedicelli clavati, infra medium constricti, ibidemque annulo rubro insigniti, spicularum infimarum curvati.

Paleæ sessiles, apicum pedicellorum continuæ? vix compressæ; *Exterior* major 5-venia, venis denticulato-ciliatis, cæterum parce hirta; arista continua, recta, scabra, paleam excedens; *interior* mutica, acuminata, 3-venia, carinâ denticulato-scabrâ, venis lateralibus lævibus, pallidis.

Lodiculæ 2. subacinaciformes, magnæ, extrorsum gibbosæ et carnosæ, introrsum sub-membranaceæ, glabræ vel apice ciliatæ.

Stamina 6. Filamenta longe exserta- Antheræ lineares, longæ.

Ovarium oblongum, glabrum.

Stigmata ratione stylorum longiuscula.

Caryopsis non visa; stipitata?

It is this genus that appears to me allied to *Zizania*. It differs, I conceive, materially from the preceding in habit, in the shape and consistence of the paleæ, which are open during the period of inflorescence, and in the outer one being awned. *Op. Cit.* p. 571.

centibus, deorsum in partibus immersis. Radiculas capillaceo divisas, emittentibus. Folia inferiora seu natantia seu semi-immersa, petiolis quam maxime cellulosis quasi inflatis; superiora omnino exserta, seu emersa longe vaginantibus, cylindraceis; ore circulari truncato, ligula obsoleta. *Limbus* semper immersus, erectus, rigidus, lanceolatus, basi cordatus, obtusus, apice sub cucullat., supra tactu scabra. Panicula erecta, tenuis axis ad ejus originem, subito angustata; rami *infimi* subverticellati divaricati, superiores alternantes ascendentes, Flores adpressi subsecundi, inferiores cujusque rami germinati, inæqualiter pedicellati, imfimi pedicellis curvatis. Superiores solitarii longius. pedicellati. Pedicelli infra medium articulati, articulis ob annulum rubrum distinctis.

Glumæ nullæ. Paleæ sessiles in apice pedicelli articulatæ, cum eo continuæ deciduæ? membranaceæ, carinatæ, compressæ; exterior major, 5 nervis, denticulato-ciliatis præsertim *medio* et marginalibus, nervis viridibus; cæterum parce *pubescens*, vel hirta, longe aristata; arista continua, scabra, gluma longiore, interior 3 nervis, mutica, suboblique acuminata, carina denticulato-scabra, nervis 2 lateralibus, pallidis lævibus. Lodiculæ 2, maxime suborbiculares, compressæ, externe gibberes, interne membranaceæ. Stam 6. Filam. longe exserta. Anth. longissimæ. Styli 2. Stigmata plumosa ratione styli magni. Caryopsis.

Proprium genus constit. videtur L. ciliata, discrepat. pedicellis articulatis ex annulatis, paleis sessilibus; exteriore aristata, palearum structura membranaceus, et forma lodicularum.

Partium situs et alternatis. Pl. CXXXIX. Fig. 147.

a. Palea exterior.
b. Ditto interior.
c, c. Lodiculæ.
d. Stamina.
e. Stigmata.

Planta in H. B. C. culta, differt. foliis nutantibus longioribus tenerioribus, nec rigidis, an eadem ?

Legi prope *Jumalpore:* eastern part of Bengal, *September* 18, 1835.

ORYZA.

1. *Oryza sativa.*—Culmis vaginis omnino vestitis. Fol. linear. pedalib. marginibus scabro. denticulatis. Ligula magna subintegra; panicula nutante subsecunda, floribus pedicellatis, solitariis, articulatis in pedicelli apicem obliquum, cujus margines membranacei.

Flores hermaphrodit. Gluma bivalvis, membranacea, mutica uniflora, valvis basi coalitis, insertione valde obliquis, subæqualibus. Paleæ 2 stipitatæ, (stipite crasso cartilagineo hinc inferne gibbo) chartaceæ, carinatæ compressæ, exterior. major., 5 nervis, longissime aristata, arista scabra: consistentiæ variæ ac palea, interior 3 nervis; obtuse mucronata. Lodicula, 1 medio emarginat. e 2 cuneatis truncatis formata. Stamina 6. Styli 2 ima basi coalita. Stigmata 2, ratione styli æqualia. Caryopsis paleis, clausis, induratis, cartilagineis asperis inclusa.

Partium situm et alternatio. Pl. CXXXIX. Fig. 149.

a. Gluma inferior exterior.
b. „ superior interior.
c. Palea 5 nervis, exterior.
d. „ 3 nervis interior.
e. Lodicula.
f. Stamina.
g Stigmata.

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2 *Oryza rufipogon.* Pl. CXLIV. Fig. II.

Erect. per elegans, in aquosis per se ? proveniens, Panicula effusa tenui, ramis patento-nutantibus, a apiculis palearum rubro-sanguineis, arista exterioris longissime paleam 4½ ties superans, scabra pulchra rufescens, siccatione albescens! Habitus *Holci Grylli* stigmata atro-sanguinea pul-

cherrima. In aquis (Jheels dictis,) prope *Hubbegunge* et *Nubbegunge*. Eastern part of Bengal *Oct*. 1, 1835.

A beautiful variety of rice "toto cælo" in aspect different from the common species O. sativa.

The Lodiculæ are split along their posticous? or inner margins; the membranous basilar portion of the edge of the inner palea, being received into the groove. These bodies adhere firmly to the inner palea along the above points, rather by the base of the fissure, and separate with it. In one case I ascertained the existence of a rudimentary third style, which was opposite to the inner central nerve of the inner palea. For the situation and alternation of the parts of the flower. See Pl. CXXXIX. Fig. 147.

It has always appeared to me that the union of all the different kinds of rice into one. O. sativa was arbitrary.

Roxburgh, however, was of opinion that all the varieties were derived from the bearded or wild rice, which has always a peculiarly distinct appearance, and is one of the most elegant grasses we possess. On the other hand Buchanan, who is an equally good authority, considers that there is more than one species, even among the cultivated rices. In Statistics of Dinagepore, p. 175, Ed. Calcutta, 1833, Buchanan says, in allusion to the practice of having a summer and winter crop from the same field, that both kinds are sown at the same time, and "although there is no difference in the management, the two kinds ripen one after the other at the appropriate seasons, which shews that there is an essential difference in the kinds."

Paleæ length, about half an inch.

Awns length from 5 to 12 times that of the palæ. Of the wild kind which is very uniform in appearance I subjoin a description.

Gramen robustum in agris profundis proveniens, ad articulos radicans, radicibus plumosissmis, vaginis longis.

Ligula maxima coriacea membranacea ad basin usque bipartita, 2 uncias longitud.; fol. sesquipedale, vel fere bipedal.

linear. ensiform. tactu retrorso-aspera, margin. denticulate antrorsu si acuminatissima.

Panicula ampla, laxa, effusa, ramis inferioribus spithamæis nutantibus, superior, erectis aspectu Holci aliquor, divisionibus scabris, inferior 3 floris, intermediis bifloris, summis unifloris.

Pedicellor. apices incrassat. irregulares, margine membranaceo obsoleti.

Glumæ 2, concaviusculæ, albæ, acutæ, membranaceæ, subæquales, floris basis cartilagineo-ossea, subglobosa extrorsu, gibba.

Paleæ carinatæ, clausæ, compressæ, coriaceæ, siliceæ, secus *venas exsertus* hirto ciliatæ, sublente lineatæ, et inter lineas punctulatæ, exterior 5 nervia, carina marginalesque majores, arista longissime subulata scabra in apiculo palæ sanguineo quasi articulat, interior, 3 venia, apiculo dentiformi, obtuso, sanguineo, marginibus præsertim infra membranaceis, exterioris margines obsoletæ involutæ.

Lodiculæ 2 subcuneatæ glabræ margine palæ inferioris proximi fissa, et paleæ margini interposito adhærenti, et cum semper secedent, ovar. glabra oblonga sessile. Styli basi coalit. plerum. rudimento 3 tia nulla. Stigmat. plumosa ramis, ramosis; ovulum basi loculi affix. vasc fasc. carpel, 2, unus cuique stylo.

In Hydropyrum, of Prof. Link; the paleæ of the male flowers are decidedly membranous; they are of tolerably equal size, and muticous, the upper, 3 nerved, the central nerve not so strong as the lateral ones, the lower 5 nerved, the central one being the strongest. There are six stamina and a very small rudiment of a female flower.

The female flowers are seated on a cartilaginous hard knob, the paleæ are much more coriaceous in their texture, and much larger, the lower one is prolonged into a continuous hispid awn of its own length, is 5 nerved, it is convolute and has three keels, of which the inner one is the sharpest and hispid, both involute margins. The inner scabrous one is membranous, acute, smooth, and has 3 veins, of which the cen-

tral one is rather faint; it is besides flat, or rather bicarinate, the space between the two lateral veins being convex outwards. The remains of the ovarium are very long. Kunth describes the palea of the female flower thus, the inferior 3 nerved, the superior 4 nerved, the two other veius may exist in the inferior, but they are very indistinct; but I find it is not so in my specimens, and the latter nervature is incompatible with a central vein, which certainly exists in this, and the nearly allied grasses.

In the female it is highly developed, and forms an absolute cup.

The spiculæ of either sex terminate a dilated foot stalk, the margin of which is submembranous, is it owing to the great development of this, that Kunth describes Zizania as having very minute glumes, connate into one orbicular. It is quite evident, I find, that he does so, for he describes the female flowers of Hydropyrum as glumate! This is a great oversight, for if this cup be a glume; Oryza has 4 glumes, and Leersia ciliaris, is also glumate.

Our indian hexandrous grasses are.

1. Leersia ciliaris, Pharus ciliaris. Retz. for I see no reason why it should not belong to this genus, at least so far as its written character is concerned.

2. Oryza sativa.

3. Oryza altera from the Khasiya hills.

4. Sclerophyllum coarctatum, Oryza coarctata, Roxb.

5. Potamochloa Retzii, Pharus aristatus Retz.

Oryza triticoides? Pl. CXLII. Fig. I. O. coarctata Buch. Ham.

Gramen in aquis salsolis proveniens. Culmis longissimis emersis bi-tripedalibus, subsimplicibus vel parce ramosis (ramis ex axillis superioribus *immersis*) (in parte immersa ad genicular. radicant.) teretibus glaberrimis, nitidis vaginis digiti longitudine subinflatis rigidis, glabris, (margins overlapping,) ore quasi perfoliatis, ciliato-fimbriatis. Ligula rotundata integra ciliata, lamina lineari-ensiforma, pedali vel

ultra, acuminatissima, rigida, conspicue striata, margine cartilagineo basin versus; dentibus pro ordine validis retrorsum, aculeato-armatis, apicem versus edenticulat. The involved margin is almost glabrous.

Panicula spiciformis, ramis rachi communis arcte adpressis, aspectu primo Triticum, vel Lolium egregie simulantibus, ramorum insertiones planiusculo-tomentosæ.

Ramulis, vel divisionibus ultimis inferioribus bi-spiculigeris, reliquis unigeris.

Spiculæ subsecundæ sunt et extrorsæ, forsan ob pressionem, dorso convexiusculæ, intus canalicato-concavæ, altera alteram plus minus involvens centro lutescentes cæterum virides. Rachillæ angulato-clavatæ, glabræ, basibus imis villosiusculis exceptis, spiculam infra cartilagineo-tumidis, (an articulato) irregulariter, demum constrictis.

Spiculæ basis tumidiusculæ parvæ. Clausæ, superior, si 2 valve.

Glumæ 2, setaceæ, cartilagineæ, albæ, paleis oppositæ, superiore longiori.

Paleæ plus minus oblique chartaceæ: 9 nerved, 3 marginal ones close, costa branched near the base, inner central vein small, on either side 3 others, so that its component parts have 3 veins. Exterior compressima, carinata, carina acutissima, obsolete denticulata, sursum dilatata in aristum continuum, cuspidiforme subulatum desinens, dorso obtuso plano. Interior compressa, excepto omnino incluso, lateribus apicis medium versus inflexis, excepto quo 1 denticulato sub mutice in mucronem parvum,

Glandulæ 2, oblongæ ovalæ pluri-venosæ cum paleis, alternæ acutiusculæ carnosæ, supra attenuatæ, margin supero denticulat. Stam. 6 lineari oblongæ basi sagittatæ.

Ovarium pediculum robustum ipsius longitudine terminus ovat., glabrum: styli crassiusculi, basi ima connati stigmatum massa plumosa ½ breviores ramulis, divisis.

Rudiment styli tertii minuti paleæ interior. ? opposit.

Ovulum——(to determine the situation of the abortive style which ought to be opposite the large palea.)

This plant I have understood, but on no satisfactory grounds, was known to Hamilton by the name Oryza coarctata.

It differs from that genus somewhat in the consistence of the paleæ, in the arista being continuous, in the stamina not becoming exserted ?, still more in the long stalk of the ovary, and perhaps in the ovulum, which appears to have at least one loose membranous coat, but on this I am not certain.

And it is so distinct in habit, that I have little doubt of its being a new genus.

It is not as nearly allied to Oryza as Zizania ciliaris which differs only from Oryza in having no glumes whatever, a difference of less importance as there is a tendency to their suppression in rice itself. Our plant besides has not the cup-shaped apex of the pedicel, which both the others have.

Spiculæ uniflora hermaphroditæ clausæ. Pedicelli apex non dilatatus ?

Glumæ planæ lineari setaceæ, cartilagineæ.

Paleæ 2, chartaceæ, exterior compressa, carinata, carina sursum expansa, apice interior lateri utrinque inflexa ! apice cuspide continua abeun. Interior, mucronata, dorso plana. Lodiculæ 2, integræ, Ovarium longe stipitatum.*

Gramen culmis longissimis, foliis rigidis, margine scaberrimis, ligulis integris ciliatis. Panicul. spiciformi nutanti erecta.

Coix.

1. *Coix Lachryma.*

Monica. Inflorescentia spicata, spicæ androgynæ, spiculæ superiores mascul : inferior, fæmineæ. Mas. spiculæ bifloræ. Mas. Paleæ 2, inferior coriacea, major, viridis, marginibus inflexis ; superior, minor, membranacea ; ambo lanceolatæ, acutæ. Glumæ floris superioris 2, membranaceæ, supera major, infera minor marginibus inflexis. Filament 3. Anth. 3

* What is Zizania terrestris Rheede, 12 to 60.

apicibus recurvis dehiscentes. Gluma floris inferior: tantum 1, (margines deorsum incurvi), antheras 3 stiriles? includens. Fæm: flores in bracteâ cornea tubulosa cylindrica canaliculata obtecta, sulca rachim florum masculorum amplectente. Palea 1, carnosa, apice 2, aristata florem involvens. Glumæ 2, concretæ, acuminatæ convexæ 1 membranaceæ, acutæ convexæ interiores. Stylus 1, Stigmat 2, penicellato.

Madras December, 1832.

ALOPECURUS.

1. *Alopecurus diandrus.* Gr. Pl. CXLII. Fig. II.

Annuum, ascendens, spithamæum. Culmis geniculatis, striatis, vaginisque glaucedine tectis. Vaginæ laxæ, folia longitudine excedentia gliratæ glabræ; juniores glaucedine tectæ, collis imberbibus. Ligulæ conspicuæ oblongæ integræ glabræ. Folia linearia, angusta, inferiora sub 3 uncialia vix lineam latitudine acuminata supra conspicua lineata tenera. Marginibus scabruisculis. Paniculæ terminales spiciformes, cylindrice obtusæ, sub biunciales; juniores nudæ. Locustæ dense aggregatæ inferiores paucæ in pedunculis, superiores solitariæ omnes sessiles obliquæ affixæ et articulatæ in apice pedicellorum incurvatorum, brevium sublaxæ scabrorum, dilatato-cyathiformi. axis parallelæ, valide compressæ, unifloræ rudimento alterius nullo

Gluma bivalvis, uniflora: valvæ compressæ, naviculares obliquæ! membranaceæ muticæ, carinatæ, facie exteriori univeniæ, carinæ venulisque ciliatis, facie interiori eveniæ læves, glabræ, ima basi coalitæ, exteriori inferiori paulo minori.

Palea 1. membranacea, compressa, navicularis apice rotundata. Glumæ exteriori oppositæ; dorso infra medium aristatæ (arista scabra paleam paullo superante, marginibus interioribus ⅔ coalitis, sub 4-venia, venis 2, utrinque aristæ, ambabus incompletis.

Stamina 2, filamenta longa, gracillima. Anth. versatilis au-

rantiaceæ, ovato-oblongæ. Radiculæ nullæ. Ovarium hinc (glumæ superiores oppositæ) gibbum: ideoque oblique ovatum. Styli 2, basi coalite. Stigmata longissima gracillima plumoso-pubescentia. Caryopsis oblique ovata, compressa styli basi apiculat, glumis paleaque immulatis obtect. libera. Pericarp. membranac. longt. albumini adhærens: Albumen molle. Embryo paleæ oppositus!!

Ex charactere Kunthei Agr. p. 23 omnia Alope, Stam. 2, glumis paleaque fructus immulatis exceptis. An genus distinctum, indicante pedicelli apice cyathiformi, insertione que obliqua locustæ.

De Stamin. situm dubito, an unum laterali, unumque aristæ opposit? vix cum stylis alternant et nec opposita sunt, uti lateralia graminum triandrum, meo casu unum venæ aristæ contiguum opposit. est, et unum venulæ lateralis lateris paleæ opposit.

Embryo certe paleæ vel aristæ opposit! Palea verisimiliter bivalvis, valva interiori superiori que aliorum bifida, vel marginibus agglutinata.

Alopecurus diandrus "Floribus diandris."

Assam in ripas arenosis *Brahmaputra* fluminis rarus. *March* 1836. *It. Ass.* 45.

Holcus.

Holcus (*Br.*) Flores paniculati (ramis alternate secundis,) alter sessilis fæmineus? alter stipitatus (in terminali bini) masculus.

Glumæ membranaceæ, acutæ Flosculus sessilis bivalvis! valva superiore glumæ interiori opposit, aristæformi, exterior, minuta ovaria involvens. Masculus, fæmineo major, univalvis valva glumæ exteriori opposit. Stam 3, Glandulæ hypogynæ 2.

Gramen elatum culmis ramosis geniculatis, facie quodammodo Bambusa, fol. linearia acuminata vaginarum collis barbatis, ligula integra. Flore fæm. sessile basi barbat., masculi-nudi, pedicellis exceptis.

Collum Khasium in sylva *Myrung Nov.* 12, 1835.

Paspalum.

1. *Paspalam.* Decumbens, culmis omnino vaginis vestitis, ligulis obsoletis. Fol. linearib. acutis subtus glaucescentibus : inflorescentia terminalis, spicis 3-4, secundis, alternantibus multi floris.

Rachis spicarum alata, inferne flores gerens. Flores alternantes, distichi adpressi, rachi pedicellis brevibus affixi. Gluma 1 flora, bivalvis, membranacea, mutica; ratione racheos inversa. Interior (exterior floris) convexa, major, 5 nervis; exterior (interior) plana 5 nervis.

Paleæ 2, chartaceæ muticeæ exterior (interior) convexa, 5 nervis, interior (exterior) inclusa, binervis.

Lodiculæ 2. Stamina 3. Styli, 2. Stigmata plumosa. Pericarp. paleis induratis, glabris lineatim punctulatis, inclusum. (Caryopsis) ab his brunneum, dimidiato-orbiculare, hæmisphæricum, membranaceum brunnescens. Embryo dorsalis, paleæ exteriori opposit., lodiculis alternant.

Mr. Brown in his Prodr. 1-188 (44) describes the structure as above, not overlooking at the same time, its great affinity with Panicum. Kunth Agr. 1-40 describes it in conformity perhaps with Mr. Brown's views, and hence he gives it as generally with one (interior) glume, in which case what I have called the outer glume, becomes the outer palea of a neuter flower, exactly as in Panicum ciliare p. 32 of this book.

Partium situs et alternatio. Pl. CXXXIX. Fig. 111.

a. Gluma inferior exterior (interior.)

b. ,, interior (exterior.)

c. Palea exterior.

d. ,, interior vel secundum, Kunth.

b. Gluma singula (interior.)

a. Palea exterior floris exterioris neutrius.

c. Exterior floris interioris hermaph.
d. ,, interior ejusdem.

Bengal. Intra *Pubnam* et *Sheerajgunge Sept.* 12, 1835.

2. *Paspalum.* Gramen in aquaticis proveniens $2\frac{1}{2}$-$4\frac{1}{2}$ pedale; foliis vaginisque pubescento-hispidis,collis barbatis. Foliis linearibus acutis, spithamæis spicis sæpius ternatis, racemosi dispositis, insertionibus parce barbatis, rachi fusci, angustati, floribus biseriatis, solitariis, alternantibus, faciebus superis (internis) approximatis contiguisque viridi purpurascentibus; glumis ovalibus, 3 nervis, inferior. planisculis, interioribus contiguisque convexiusculis.

Col. Khas. In aquosis *Nunklow, Nov.* 16, 1835. *It. Ass.* 259.

3. *Paspalum,* Pl. CXLVI. Fig. I. Basi prostratum radicansque.

Culmis ramosis purpureis glabris lævibus infra medium geniculatis, vaginis laxis compressis, glabris, ligula rotundata, integra.

Foliis lanceolato-linearibus, basi subcordatis, acuminatis, basi collisque pilis longis, parcis pilosis, marginibus cartilagineis, denticulatis-

Spicis 5-6 racemosis, infima e 2-3 aggregatis, etiam racemosis, insertionibus incrassatis, breviter pilosis, axi cæterum glabriuscula.

Rachi complanati, marginibus minute undulatis, flosculos lalitudine paullo superant.; flosculis stipitatis, stipitibus 3-5 aggregatis, si solitarius tantum axi adnatis, et decurrentibus ad exsertionem propriam, lanceolatis, sessilibus, et orbiculatis, apice dilatato-stipita secundis, alternis axi adpressis.

Locustæ bifloræ, lanceolatæ, postice convexiusculæ, antice planæ.

Gluma 1, postica, lanceolata; acuta mutica ciliata, 3 venia interveniis ciliatis!

Flos exterior 1 paleaceus, neuter. Palea glumacea, ovato-

lanceolata, (æquans vel paullo superans glumam) breviter ciliata, 5 venia, interveniis venular. lateratim ciliatis!

Flosc. interior hermaphrodit. Paleæ ovatæ, acutæ muticæ, chartaceæ striatæ, interstriis punctatis. Exterior convexiuscula, marginibus involutis hyalinis, tenuissime striatis impunctatis,3 venia, venis indistinctis. Interior-marginibus involutis, bivenia.

Stam. 3. Anth purpureæ. Lodiculæ 2. ovatæ emarginatæ. Styli 2. Stigmata plumosa, ratione stylorum æqualia, ramis simplicibus, obsolete dentatis; ovar. ovato-pyriforme. Caryopsis.

In ripas arenosas *Brahmaputra. Upper Assam, April* 3, 1836. *It. Ass.* 470.

Pasp. Spicis racemosis 6-10, floribus 3-5 aggregatis, stipitatis, lanceolatis, gluma paleaque floris neutrius ciliatis, hac 5 venia, interveniis *lateralibus* ciliatis, illa 3 venia, interveniis ciliatis; culmis lævibus, glabris, fol. lanceolato-linearibus, basi parce pilosis, ligulis integris, vaginis compressis.

Milium.

1. *Milium ramosum* Pl. CXXXIX. Fig. 60. Retz. Roxb. Fl. Indica 1 p. 317.

Milii (Brunonis) est vera species; confer ejus characterem in Prodr. Novæ Holland, 1. p. 187, vel 43, Eriochloæ vix vera ac legitima species quoniam spiculæ infimæ pluriflorae et flores hermaphroditi sunt. Glumæ, basi cupula purpurea, cartilagineæ cinctæ. Caryopsis convexa complanata, lineis intro-marginalibus not. Embryo glumæ exteriori opposit.

Char. Gen. Spiculæ paniculatæ secundæ inferiores pluriflorae, superiores sæpius bi-triflorae; floribus omnibus hermaphroditis, in apice pedicelloram articulatis, basi cupula cartilaginea cinctis

Gluma bivalvis, valvis æqaulibus acutis muticis, exterior. paulo convexiore, extus pilosis.

Paleæ inclusæ, 2 exterior major, alteram involvens: subcucullata, apice mucronata; interior, marginibus involutis, mutica.

Lodiculæ duæ cuneatæ paleæ exteriori oppositæ.

Stamina 3. filamentis apicis versus subiter angustatis.

Styli 2; eodem modo angustati. Stigmata plumosa.

Pericarpium, paleis induratis ceterum immulatis, involutum et coalitum, inferne convexius. superne planiusculum intermargines utrinque lineatum, obmarginibus paleæ inferioris introflexis.

Embryo glumæ exteriori oppositus.

a, a. Outer glume.

b, b. Upper and inner glume.

c, c, c, c. Outer palea.

d, d, d, d. Inner and upper palea.

e. Lodiculæ.

Bengal, on the Jellinghey river, Septr. 7, 1835.

PANICUM.

1. *Panicum stagninum Roxb.* Fl. Ind. 1 298. Oplismenus stagninus, Kunth Agr. 1-144.

Gramen basi decumbens, 2, 3 pedale. Culmis lævibus, fol. linearib.basi parum latioribus glabris,margine cartilagineo-denticulatis, ligulis obsoletis, vaginarum faucibus pilis paucis setaceis. basi tumidis ciliat. pilis cito basin relictis deciduis. Rachi communi scabra sulcati partialibus secundis pubescenti, hirtis adpressis approximatis, floribus 4 fariam, imbricatis, geminatis, breviter pedicellatis, pubescentibus, gluma interiore breviter, palea exteriore floris neutrius longe aristata, rachibus setigeris.

Gluma exterior latior, brevior breve acuminata, 3 vel 5 nervis, planiuscula, interior major convexa, 5 nervis, breve aristata.

Palea exterior, floris exterioris neutrius, glumæ interioris consistentia et forma sed longe aristata præsertim exteriorib.

interiorum sæpe nanis 5 nervis, (aristis denticulatis). Interior secus nervos ciliata, membranacea, acuta.

Flores hermaphroditi paleæ chartaceæ glabræ ; exterior convexæ apice mucronulo brevi viride hispidulo, 5 nervis, quorum lateralibus apicem versus paleæ distinctis ; interior involutis, marginibus planiuscula, binervis mucrone scabrello.

Lodiculæ 2, Stam. 3, Styli, 2. Stigmata penicellata. Pericarpium liberum, paleis induratis cartilagineis inclusum, ab his lucidum, 5 nerve mucronatum, hispidulo, fusco-guttatum. Embryo paleæ exteriori opposit.

Legi in oryzetis cumpræcedent.

Meo sensu verum nullum discrimen inter Panica et Oplismenum exstat. Vidimus etiam in *P. crus galli*, Pl. CXLVII. Fig. II. Paleam floris neutrius exteriorem mucronatam vel aristatum. Hæc species proxime, P. grossario p. 36.

Differt tantum basibus foliorum ciliatis, aristis florum et floribus germinatis. Partium situs et alternatis omnino ut in P. Grossario, Pl. CXXXIX. Fig. 113.

2. *Panicum ægyptiacum*, Roxb. Fl. Ind. 1-293 ? Kunth Agr. 1, 83.

Gramen basi decumbens, *tenerum* ? cæspitosum 1, 1½ pedale.

Culmi glabri vaginæ laxæ plus minus hispidæ, fauces pilis paucis longis barbatæ ut etiam foliorum bases. Ligulæ breves. Fol. linearia acuta, crispata hirsuta. Spicæ digitatæ vel spicatæ (3-4,) rachis dilatata undulata : flores adpressi secundi gemini inæqualiter pedicellati, exteriore vel inferiore longius. stipitato. Gluma exterior minutissime, fere obsoleta ; interior lanceolata paleis brevior, 3 nervis, ciliata pilosaque. Palea floris neutrius unica (exterior) glumacea lanceolata membranacea acuta, 7 nervis, nervis lateralibus approximatis parce pilosa. Paleæ floris hermaphroditi læves chartacei subæquales, acutæ, exterior 3 nervis, interior binervis. Stamina 3, filamentis dien persistentibus. Lodiculæ 2 etc.

Alternation and situation of parts. Pl. CXXXIX. Fig. 131.

a. Gluma exterior minutissima.
b. „ interior.
c. Palea glumacea floris neutrius.
d. „ exterior floris hermaphr.
e. „ interior.
f, *f*. Lodiculæ; *g*, *g*, *g*. Stamina.
h, *h*. Stigmata.
P. Ciliare proxima species.

Legi ad ripas fluminis paullo infra *Jumalpore: September 14th*, 1835.

3. *Panicum serrulatum*, Roxb. Fl. Ind. 1-309. Kunth Agr. 1-126.

Gramen late repens radicans. Culmis (erectis) 2 pedalibus, lævibus articulis glabris, humidis, vaginis ciliatis, ligula brevissima truncata, axillis gemmiferris ! Fol. latiuscule linearia acuminata basi lato-cordata, glabra margine cartilaginea, purpurascente denticulato. Panicula contracta, dimidiata, vel subsecunda, divisionib. infimis distantibus, superioribus approximatis in spiram obscuram dispositis, spiculis cujusque divisionis secundis, 6-8 floris, floribus secundis, sæpius in fasciculis tribus, quorum infimus ternatus medius, ternatus vel binatus summus binatus, floribus ovatis inæqualiter sed breviter pedicellatis (extimo brevis, intimo longuis nempe.) Gluma exterior concava, late ovata, acuta, mutica, 5 nervis, nervo centrali scabro; marginibus, baseos postica? approximatis, interior ovati-acuta, mutica, 5 nervia, centrali scabro. Palea exterior, floris neutrius (exterioris) glumacea, glumæ interior consimilis, nervo centrali vix scabro. Interior lanceolato-linearis, acuta binervis, nervis ciliatis, marginibus introflexis.

Palea exterior floris hermaph. dorso convexa, ovata acuta, apice scabrelle *binervis!* nervo centrali nullo, 2 lateral obsoletis, interior conformis minor, dorso plana binervis.

Lodiculæ 2, angusti *cuneatæ semi exsertæ* apice concava

emarginata. Styli 2. Stigmata 2, ratione styli æqualia. Caryopsis.

Alternation and situation of parts Pl. CXXXIX. Fig. 198.

a, *b*. Glumæ.

c, *d*. Paleæ floris neutrius.

e, *f*. „ hermap. *Jumalpore : Sept.* 23*rd*, 1835.

4. *Panicum uliginosum*, Roxb. Fl. Indica. 1-310 Kunth Agr. 126.

Gramen glaucum basi decumbens. ($1\frac{1}{2}$ vel, $3\frac{1}{2}$ pedale) articulis vix incrassatis, vaginis glabis, marginibus ciliatis, ligula brevissima, fol. linearia glauca, vaginis duplo fere longiora, linearia acuminata, basi subcordata, supra pilosa vel glabra, marginibus crassis, cartilagineis levibus. Panicula tenuis, rami pauci alternantis patuli, nutantesve subglabri; floribus ovatis geminatis, exteriore longiuscule pedicellato, æqualiter convexiusculis *diaphanis*. Gluma exteriore subcyathiformis, membranacea, enervis, interior ovata, acuta, mutica, 9 nervia, nervis lateralib. approximatis.

Palea exterior floris exterioris *masculi* conformis *convenia*; interior multo minor bifida! plana, binervis, nervis scabris, marginibus intro flexis. Stam. 3. Lodiculæ 2, $\frac{3}{4}$ exsertæ, minores ac in hermaphrod.

Paleæ floris hermaph. membranaceæ, muticæ ovatæ, exterior 1 nervis, (obsolete 3 nervis.) Interior obtussima sub e nervis, marginibus parum inflexis. Lodiculæ 2, exsertæ, cuneatæ subintegræ emarginatæ. Stam. 3. Antheræ (utriusque) fusco-aurantiaceæ brunneo guttatæ. Caryopsis.

Descriptio e specimen : parvis, enucleata. Alternation and situation of parts, Pl. CXXXIX. Fig. 200.

a. Glume exterior enervis.

b. „ interior.

c. Palea exterior floris neutrius.

d. „ interior.

e. „ exterior floris herm.

f. „ interior stamina etc.

Sp. distincta, ob glumam exteriorem enervem : ob nervationem palearum floris hermaphrod. ob paleam interiorum floris masculi bifidam. *Jumalpore: Sept.* 24*th*, 1835.

5. *Panicum brevifolium*, Roxb. Fl. Ind. 1-308? P. trichoides Kunth Agr. 112?

Gramen foliosum culmis basi repentibus radicantibus. Vaginis ciliatis pubescentibusque, fol. lanceolat tenera repanda, margine subsimplicia denticulata, bases versus ciliata pilis paucis setosis e basi bulbosa ortis, ab eâ demum secedentibus, subtus pubescentia. Ligula integra truncata. Panicula oblonga ex axillo folia suprema semi-exserta. Pedicelli 1 flori, gracillimi minuto-denticulato ; floribus *inferne* ventricosis, sup. ne 2, in quoque ramulo paniculæ, infero brevius pedicellato.

Gluma exterior ovata, acuta, mutica, vix carinata, 3 nervis, nervo centrale *scabrello*, inferior *distans* ob florem breve pedicellatum, naviculari-ventricosa, nec carinata, obtussime-subcucullata apice breve ciliato.

Palea exterior floris neutrius ejusdem *unica* (an semper?) consistentia, convexiuscula ; late ovata obtussima fere rotundata apicem versus ciliata, 5 nervis, nervis lateralibus indistinctis, in nervo centrali infra apicem arcuatim confluentibus. Palea exterior floris hermaphr. membranacea, naviculari-ventricosa omnino ut in gluma interiore, 5 nervis, apice callo viride, sub cristata, interior minor navicularis, nec carinata, 2 nervis.

Lodiculæ 2, cuneatæ, emarginatæ. Stam. 3, Styli——, Stigmata ratione styli, æqualia? plumos.

P. brevifolium. Roxb. Fl. loc cit proximum.

Alternation and situation of parts, Pl. CXXXIX. Fig. 196.

a. Gluma exterior.

b. „ interior.

c. Palea exterior floris neutrius.

d. „ „ herm.

e. „ interior ejusdem. *Jumalpore: Sept.* 23*rd*, 1835.

6. *Panicum tenellum*, Roxb. Fl. Indica 1-309. P. Roxburghii sp. Kunth Agri. 126.

Gramen elegans gracile, decumbens, fol. vaginis fauce barbatis cæterum glabris ligulis obsoletis, limbis linearibus acuminatis, plus minus pilosis teneris, marginibus subsimplicibus, vix denticulat. scabris. Panicula ovata ampla, pedicellis solitariis unifloris filiformibus, scabris, floribus ovatis rubris.

Gluma exterior ovata carinata, carina scabra, mucronata, baseos marginibus postice approximatis, 3 nervis, interior major conformis vix carinata, 3 nervis *distans*. Flores breviter pedicellati, exterior masculosi bivalvis. Palea exterior glumacea, *membranacea*, mutica, 5 nervia, interior oblonga membranacea marginib. involutis binervis.

Paleæ, floris interioris hermaphroditi ellipticæ! ovales muticæ membranaceæ exterior marginibus parum involutis, 5 nervis, interior, marginibus parum involutis. Lodiculæ cuneateæ apice sub bilamellatæ. Styli 2, Stigmata plumosa ratione stylo breviusculæ. Caryopsis ellipsoidea, lævissime nitida griseo-alba lineis 5, albis nervis correspondentibus: livido-lineatis convexo planiuscula.

Alternation and situation of parts, Pl. CXXXIX. Fig. 194.

a. Gluma exterior.
b. Ditto interior.
c. Palea exterior glumacea floris neut.
d. Ditto interior.
e. Ditto exterior floris herm.
f. Ditto interior.
g. Lodiculæ.
h. Stamina.
i. Stigmata. *Jumalpore*, in *Pascius*: *Sept*. 23*rd*, 1835.

7. *Panicum*. Gramen basi decumbens 1-2? pedale, vaginis folia æquantia vel superantia, marginibus apices versus ciliatis, faucibus barbatis in ligulis obsolet, lamine lineata acuminata,

supra longe parceque pilosis, marginibus cartilagineis vix scabris, spicis 3 digitatim fasciculatis, patentis, erectis, vel pluribus alternantibus, secundis, rachi undulata gracili, 3 gona; marginibus cartilagineis denticulatis ; floribus ternatis, inaqualiter pedicellatis, pedicelis scabris, inferioribus ! vel exterioribus aliquando abortientibus. Gluma exterior O. interior minima, late ovata, membranacea; externe pilis apice capitalis albis lanata. Palea glumacea floris exterioris neutrius ovata mutica, 5 nervis, dorso iisdem pilis lanata.

Palea floris hermaphrod : glabræ ovatæ membranaceæ muticæ, exterior acutæ, marginibus *incumbentibus* ? Lodiculæ 2, cuneatæ membranaceæ, quoad paleam interiorem omnino externæ. Palea interior eodem modo convoluta. Stam. 3. Styli, Stigmata 2, plumosa, ratione styli brevia, fere pedicillata. Caryopsis paleis induratis, brunneis, glabris lineato-punctulatis acutis, inclusis: dorso convexa, *ventre* vel antice plana.

Rudimentum paleæ interioris floris neutrius vel nullum vel minutum cellulosum.

In graminosis, *Jumalpore* : *September* 20*th*, 1835.

An P. propinquum Br. Pr. 1, 193 (49.) Stirps Roxburghio vix cognita.

Situation and altern. of Parts Pl. CXXXIX. Fig. 171.

a. Gluma *unica* interior.
b. Palea glumacea floris neutrius.
c. ,, interior minuta.
d. ,, exterior floris herm.
e. ,, interior.
f,*f*. Lodiculæ.
g, *g*, *g*. Stamina.
h, *h*. Stigmata.

8. *Panicum hirsutum.* Kunth. ! Roxb. Fl. Indica. 1-303.

Remarkable for the breadth of the outer glume, the margins of which overlap posticously and for the occasional presence of a minute inner palea to the outer neuter floret.

Glumæ valvæ exterior membranaceæ latissime marginibus postice incumbent., mutica, 9 nervia, nervis lateralibus minutis incompletis interior ovata mutica, 7 nervis.

Palea exterior glumacea, floris exterioris neutrius, 5-nervis: glumæ interior conformis. Interior; membrancea minuta, oblonga apice rotundata, obsolete binervis. ?

Paleæ floris interioris hermaphrod., charteaceo-membranaceæ lineatæ, muticæ, marginibus involutis, exterior convexa, 5 nervis, interior planuiscula, *dorso*; ibidemque tantum chartacea, marginibus latis membranaceis. Lodicula 2; externe quoad paleam interiorem sitæ, carnosæ cuneatæ truncatæ *extrorsum divisæ*: potius extrorsum conduplicatæ. Stam. 3, Styli 2, Stigmata plumosa ratione styli-subæqualia. Caryopsis.

Gramen, prostrat; hursitum: fol. lanceolat, basi cordatis; vaginis barbato-ciliatis; culmis ramosis, ramis floriferis basi geniculat. Spiculis alternis patentibus, pluri floris, floribus secundis solitariis alternis sessilibus.

Situation and altern. of parts Pl. CXXXIX. Fig. 160.

a. Gluma exterior.

b. Ditto interior.

c. Palea glumacea exterior floris neutrius.

d. Interior.

e. Palea exterior floris hermaph.

f. ,, interior.

g,g. Lodiculæ.

h,h. Stigmata.

Legi prope *Jumalpore*: *Sept*. 18*th*, 1835.

9. *Panicum* Erectum 3, pedale, culmis glabris sublævibus, vaginis foliis duplo breviorib. *ciliatis*, ligulis obsoletis, fol. linearibus acuminatis, base late cordatis, ciliatis, faucibus vaginarum pilosiusculis.

Panicula laxa nutante, ramis alternis spiculis plurifloris alternis secundis, pseudo-spiraliter dispositis; floribus, inferioribus cujusque spiculæ terminatim aggregatis inæqualiter pedicellatis; 1, vel inferioribus potius exterioribus sæpe abortivis, terminali cujusque spiculæ binato; ambobus fertilibus.

Flores perfecti gluma exterior membranacea ovata, basi lata, marginibus postice conniventibus, indistincte 5 nervis (superior) interior major ovata, mutica *convoluta*, 5 nervis.

Flos exterior neuter bipaleaceus. Palea exterior glumæ superiori similis, sed majis membranacea, 5 nervis.

Interior membrancea oblonga, vix acuti subbi-carinata, carinis denticulati-ciliatis, marginibus incurvis, respectu axis, floris neutrius binervis.

Paleæ floris interioris hermaphroditi membranaceæ, acutæ muticæ, exterior lanceolata, 4 nervis, nervo centrale obsoleto, interior minor binervis. Lodiculæ 2, cuneatæ *semi exsertæ*. Stam. 3, Styli 2, ima basi coaliti. Stigmata ratione styli longa plumosa. Caryopsis.

Situation and alternation of parts Pl. CXXXIX. Fig. 164.

a. Gluma exterior.

b. Ditto interior.

c. Palea exterior glumacea floris neutrius.

d. Ditto interior.

e. Palea exterior floris hermaphrod.

f. Ditto interior.

g,g. Lodiculæ semi exsertæ respectu paleæ interior.

h,h,h. Stamina.

i,i. Stigmata.

Legi in aquosis. *Jumalpore : Sept. 20th*, 1835.

10. *Panicum plicatum*, Roxb. Fl. Ind: 1-313. P. asperatum Kunth. Agr. 1. 126.

Gramen erectum 4, 5, pedale culmis vaginisque laxis hirtis compsessis, collo barbatis ligule subobsoleta dense ciliata. Fol. lanceolata utrinque sed præsertim apices versus acuminata, pulchre plicata, tactu retrorso scabra, marginibus cartilagineis denticulatis. Panicula effusa nutans scabrelli ramis filiformibus elongatis subsecundis, floribus subsecundis, infimis fummisque binatis, rachilla denticulata ultra florem terminalem plerumque tabescentis in processum aristiformem eodem modo-denticulatum product.

Gluma exterior 3 plo minor late ovalis obtusissima, 3 nervis,

marginibus postice approximatis, interior ovato acutiuscula, 7-nervis; palea exteriori floris neutrius exterioris sub acuminati 5-nervis brevior. Palea interior hujusdem lanceolata membranacea, marginibus incurvis, nervis indistinctis. Flos. interior hermaphrodit. extrorsum convexus introrsum concavus (quoad floris axin) Paleæ membranaceæ? (sub immaturæ,) acutæ muticæ exterior 5-nervis, interior binervis, marginibus inflexis membranaceis.! Stamina 3. Lodiculæ cuneatæ, margine superiore lunulato. Styli 2. Stigmata plumosa ratione stili æqualia.

Erectum, asperum; fol. lanceolatis utrinque acuminatis, plicatis, vaginarum collis barbatis: ligulis ciliatis. Panicula effusa nutante, ramis filiformibus, floribus inferioribus germinatis, reliquis solitariis; rachilla ultra flores quemque *terminalem* in aristam producta, gluma interiore flosculis breviore. Floris solitarius pedicellus raro apicem paulo infra in aristam product; terminalis cujusque ramuli ut etiam rachillæ communis semper.

P. costatum Roxb. anne P. plicatum Lam? Mauritii indigenum.

Situation and alternation of parts Pl. CXXXIX Fig. 229.

a. Gluma exterior.
b. ,, interior.
c. Palea exterior glumacea floris neutrius.
d. ,, interior.
e. Palea exterior floris hermaphr.
f. ,, interior.

Bengal. Circa tecta ad margines fluminis *Barak Hubbe gunge* prope: *September* 1*st*, 1835.

11. *Panicum fluitans*, Roxb. Fl. Ind. 1 296. Kunth Agr. 1,78. Proximum *P. mucronata* Roth.

Gramen paludosum basi decumbens, culmis compressis vaginisque folia superantibus glabris, collo barbatis ligulis O· folia linearia acuta.

Spica filiformis nutans, rachi trigona, facie concava, alternata supera inferaque. Spiculæ alternæ adpressæ, infimæ alternatæ superæ inferæque superiores sub secundæ; floris rachilla 3 angulari, dorso plane undulato, marginata, margine scabro, ultra alterna folilaria, sub florem terminalem in aristam brevem product. sessilis, antice plana, postice convexa Gluma exterior minima membranacea suborbicularis, obtussima, enervis; interior duplo major ejusdem consistentiæ, nervis 3, viridibus, parum distinctis. Palea exterior, floris exterioris neutrius, unipaleacea glumacea membranaceo-chartacea subobtusa, mutica, nervis 5, viridibus, distinctis.

Paleæ floris interioris hermaphr. cartilagineæ chartaceæ muticæ transverse rugosæ exterior convexa, apicula breve obtusa 4-nervis!, interior conformis binervis, marginibus basim versus membranaceis. Lodiculæ 2, oblongo-cuneatæ, integre truncatæ. Stamina 3. Styli 2. Stigmata plumosa, ratione styli longuiscula, ramis denticulatis. Caryopsis, indurata ossea semi ovata apiculata, dorso convexa et 3-nervis, ventre convexiuscula enervis (marginibus paleæ exterioris involutis glabris) cæterum papulis venu cosulisve transverse dispositis, scaberrima. Pericarpium liberum. Embryo paleæ exteriori oppositus.

Bengal. In humidis inundatis prope *Hubbegunge* fluminis *Barak* copiosa: *September* 29*th*, 1835.

Alternation and situation of parts. Pl. CXXXIX. Fig. 231.

a. Gluma exterior.

b. ,, interior.

c. Palea exterior unica glumacea floris neutrius.

d. ,, exterior floris hermaphrodit.

e. ,, interior.

Sp. distinctissima, ob spicas filiformes spicularum dispositionem, terminationem racheos: glumas minimas paliusque floris hermaphroditi abinitio rugosas, cartilaginea.

12. *Panicum interruptum*, Roxb. Pl. CXLVI. Fig. II. Fl. Ind. 1-289 Kunth Agr. 1 87.

Gramen in aquosis proveniens, flutians, culmis immersis crassis cellulosis geniculatis, emersis 2 pedalibus erectis, vaginis fere omnino vestitis, vaginis glabris. Ligula rotundata, fol. linearia acuminata, basi simplicia discolori magis cellulosa, nervosa, glabra, margine cartilagineo-lævi. Spica simplici clavato-cylindrica curvata (potius nutans) floribus undique tectis, sine ordine sparsis, pedicellatis, abortientibus plurimis immixtis, infra planiusculis supra convexis glabris. Antheris, stigmatibusque purpureis.

Gluma exterior multo minor ovalis, mutica marginibus postice approximatis, sub 5-nervia, interior ovata mutica, apice minuata denticulat glabra, 7-nervia.

Floris exterioris hermaphroditi, palea exterior glumæ interior similis, 9-nervia. Interior minor oblonga, subenervis! Lodiculæ 2, rotundatæ cellulosæ subintegræ. Stam. rudiment minima 3.

Floris interioris hermaphr. paleæ ovatæ membranaceæ levissimæ, muticæ ,exterior 5-nervis ; nervis indistinctis, interior binervis. Lodiculæ 2, carnosæ obtuse 3 angulares. Stamina 3, Stigmata plumosa, ratione styli longi longeque basi connati, subæqualia.

Alternation and situation of parts Pl. CXXXIX. Fig. 221.

a. Gluma exterior.
b. ,, interior.
c. Palea exterior glumacea floris neutrius.
d. ,, interior.
e. Palea exterior floris herm.
f. ,, interior.

13. *Panicum strictum*, Roxb. Fl. Ind. 1, 306, Oplismenus ? strictus Leh : Kunth Agr. 1, 147.

Gluma bivalvis biflora inæqualis, membranacea ; valva exterior ovata mutica marginibus baseos postice approximatis, 5-nervis, nervis 3, centralibus majoribus, carinatis, scabris ; interior longior obtuse acuminata, 5-nervis, nervis minus prominulis, parce setis brevibus hispidis. Flosculus exterior neuter

(masculusve ?.) Palea exterior subglumacea, lanceolata mutica glabra acuta, 3-nervis, interior membranacea breve mucronata binervis.

Interior fæmineus vel hermaphroditus ? basi pilis velosis cinct. Paleæ angusto-lanceolatæ, semen obvolventes, chartaceæ brunneæ exterior (aristata,) papulosa scabrella 3-nervis ; interior binervis.

Pericarpium angustissimum, cylindraceo in subulat. Embryo maximus, ratione albuminis.

Palea exterior floris fertilis arista denticulata brevi, facillime solubili, apice glumam interiorem æquante !

Gramen erectum, 3, 4 pedali rigidum, culmis ad articulos dense barbatis, vaginis ciliatis, inferioribusque hispidis, collo ciliatis ; fol. longis, lineari-lanceolatis, bases versus pilis longis albis hirsutis cæterum hirtis, marginibus cartilagineis denticulatis. Paniculo subcylindracei sulcato, hirtis spicis, sparsis interdum subverticillatis, floribus geminatis breve pedicellatis, fuscis, secundis, odore moschato forte, (vix proprio) Bengal. Ad ripas *Brahmaputra*, infra *Ossunpoor* : *Sept.* 27*th*, 1835.

Panica vix species, ob glumas subæquales florem fertilem basi setis circumdatum, paleam exteriorem (nec floris neutrius) aristatam, ut etiam ob ejus consistentiam.

Habitus Eleusine ?

14. *Panicum montanum*, Roxb. Fl. Ind : 1-315 ?

Gramen basi decumbens, foliosum ; vaginis, ex maxima parte culmum vestientibus, ciliatis, collo glabris, ligula margine rotundata ; fol. oblongo-lanceolata obliqua, (nervo centrali nempe nec) lineata, acuminata, supra tactu retrorsum scabra, repanda, marginibus denticulatis, bases versus ciliatis, subtus glaucescentibus. Panicula effusa scabra, insertionibus cartilagineis. Pedicellis pubescentibus : floribus secundis, infimis 3 natisii pedunculo, intermedium geminatis, superioribus solitariis. Gluma exteriore nulla, Palea floris hermap. aristata ?

Cum præcedentibus in umbrosis, vidi specimina immatura.

15. *Panicum* (*Chamæraphem*) *intermedium*. PSEUDORAPHIS. *Brunoniana* Gr.

Gramen fluitans culmis longissime immersis longeque fluitantibus geniculatis, adgeniculas radicantibus compressiusculis, vaginis glabis collo nudis, folia excedentibus, ligula 3 dentata, dente intermedio minore, fol. linearia, 2-3 uncialia, obtusiuscula, 3-nervia, margine subsimplici denticulato, panicula terminalis ovata effusa, sub glabra inferne 4 gona, sub excavata, floribus 1 vel 2 infimis sessilibus in excavationibus nidulantibus, superioribus stipitatis sæpissime solitariis stipite ultra florem quemque si unicum vel si 2 ultra florem terminalem in aristam subulatem denticulatam, flore duplo longiorem producto, stipite et prolongatione denticulate scabra, denticulis antrorsis

Gluma exterior membranacea parva alba, subcrenulata, enervis ratione interioris minima. Gluma interior lanceolata acuta submutica, marginib parum involutis, sub ciliatis nervo striata. Flosculi sub 13-nervia dissimiles: exterior masculus duplo triplove major. Palea exterior glumæ interiori similis, sed margines majis involuti in scabrelli. Interior duplo minor breviorque membranacea glabra, apice bifido, dente setiforme, minimo interdum interjecto, nervis 2, lateralibus indistinctis infra apicem, desinentibus. Lodiculæ 2, paleæ interiori omnino externæ, oblongæ subrhomboideæ integræ apices dilutissime viridescentes ?

Stam 3, antheris sanguineo-rubris.

Paleæ floris interioris fæminei ovato-lanceolatæ, muticæ membranaceæ exterior enervis, interior latior magis obtuse, et involuta, binervis, nervis infra apice desinent. Stamina rudimenta 3. Lodicula 1. vel 2 angustæ. emarginatæ. Styli 2, ima basi coaliti, longi. Stigmata plumosa ratione styli longissima purpurascentia.

Situation and alternation of parts Pl. CXXXIX. Fig. 217.

In acquis currentibus profundis. *Bengal*, *Goalnugnr* : *Septr.* 28*th*, 1835.

a. Gluma exterior.
b. ,, interior.
c. Palea exterior subglumaceo floris exterior masculi.
d. ,, interior.
e. ,, exterior floris minoris fæminei.
f. ,. interior.

An novum genus hoc modo distinguenda. Gluma bivalvis bi-flora, valvula exteriori minima. Flosculi dissimiles: exterior *major* masculus interior fæmineus. Palea exterior floris masculi *glumacea* interior membranacea, apice bifida. Gladandulæ hypogynæ 2, integræ, Styli 2, Caryopsis.

Gramen fluitans fol. disticta linearib. 3-nervis. Ligula rotundata. Panicula effusa subsimplex, flores 1. vel 2 infimi in excavationib, racheos communis semi nidulantes, sessil es, reliqui sessiles in ramos paniculæ rachillâ ultra florem quemque in processum aristiforma producta, arista siccatione flexiosa. Ominno intermedium inter Panica Sect. vij Br. Pr. 1, 193 (49 et Chamæraphem.)

16. *Panicum.* Gluma exterior minutissima lævis, membranacea enervis truncata.

Interior flosculos æquans, lanceolata acuta mutica, 5-nervis, interstitiis dense adpresseque lanato-villosis.

Palea exterior unica floris neutrius huic omnino similis, at 7 nervis.

Paleæ floris hermaphrodit conformes acutæ muticæ, sub chartaceæ, palea exterior marginibus inflexis membranaceis, convexa 3-nervis, inferior binervis.

Lodiculæ 2, interdum basibus coalitæ oblongæ, emarginatæ an semper? *omnino externa.* Stamina 3.

Stigmata plumosa, ratione *stylorum* æqualia.

Caryopsis.

Gramen parvulum elegans sub spithamæum pedaleve culmis filiformibus: ligula maxima, spicis digitatis, binisque vel ter-

nis sub digitatis rachi flexuosa, floribus secundis binis vel ternis ex eodem sub eodemve puncto ortis pedicellis in æqualibus, exteriore longiore.

An. P. ciliare Roxb. Fl. Ind. I. 293.

Certi non Retzii (monenti et. Brunone Pr.; Fl. Novæ Holl. 1. 192. 48.) ob. glumam interiorem flosculum æquantem.

Affine P. tenui floro Br. Pr. loc. cit.

Ripæ. Booree Barak: October 4th, 1835.

17. *Panicum.* vix *P. unbrosum* Roxb. Fl. Ind 1. 300.

Gramen basi decumbens radicans parte erecta 1½-2 pedale, culmis teretibus lævibus glabris vaginis limbo foliorum duplo brevioribus, laxis marginibus ciliatis collo nudis, ligulis obsoletissimis; fol. lanceolate acumenatis basi cordatis, 2-4 uncialibus, glabrus, marginibus cartilagineis, scabris, spicis paucis alternantibus patentibus, racemosim. dispositis: insertione pubescentibus, rachi rachillisque angulatis scabrellis floribus in æqualiter pedicellatis, geminatis pedunculo brevissimo insertione pubescent, interiore quo ad axin longius pedicellata.

Glumæ ovatæ sub glabræ muticæ carinatæ marginibus basi incumbentibus, exterior minor 3-nervis, interior flosculos æquans, 5-nervis.

Palea glumacea floris exterioris neutrius huic omnino similis interior multo minor membranacea hyaline acuti marginibus pubescentibus binervis. Lodiculæ 2 rudimentariæ. Staminumque rudim. 3.

Palea floris hermaphrod interioris breviter stipitata chartacea; exterior ovata convexa 5-nervis dorso 3-nervis, cuspide falcato viride subcalloso! interior binervis, apiculo obtoso-membranaceo bifido utrinque nervo viridi donati. Lodiculæ 2, cuneatæ repandæ, extrorsum conduplicatæ. Stam. 3, Stigmata plumosa ratione stylorum brevia

Huic proximum est *P. hirsutum* p. 22, Decumbens fol. lanceolato-acuminatis basi cordatis, vaginis ciliatis. Ligulis obsoletissimis, spicis alternis.

18. *Panicum.* Scandens in fruticibus, culmis geniculatis ramosissimis teretibus lævibus, vaginis glabris collo parce pilosis ligula obsoleta. fol. linearia, basi subcordata acuta, glabra vaginas superantia, marginibus cartilagineis denticulatis.

Panicula tenuis effusa suberecta rimisque alternantibus oppositisve, scabrellis; floribus adpressis carneis lanceolatis, rubescent. sub secundis, spiculis inferioribus 6-8 floris summis 3-2.

Gluma exterior obtusa lanceolata interior latior, parum longior flosculis 2½ brevior; ambo membranceæ, 3-nervis.

Palea exterior floris neutrius lanceolat. mutica, apice acutiusculo pubescente, 7-nervæ. Interior O.

Palea exterior floris hermaphrod. lanceolata membranacea, 5-nervis, sub ciliata; interior obtusissime oblonga binervis. Lodiculæ cuneatæ dentatæ extrorsum conduplicatæ. Stam 3. Styli 2, ima basi coalita. Stigmata ratione styli breviss. plumosa. Caryopsis.

Secus ripas rivuli *Dhumna Chattuck, eastern part of Bengal: October 2nd,* 1835.

Culmis ramosis scandentibus vaginis ciliatis collisque parce barbatis, ligulis obsoletis fol. linearis, glabris, basi sub cordatis : spiculis inferioribus cujas ramuli paniculæ plurifloris, glumis sub æqualibus, utroque flosculo duplo breviore.

19. *Panicum ciliare Retz.*

Spicæ digitatæ. Flores geminati, rachi angulati adpressi, alter (exterior) stipitatus, alter interior subsessilis; Glumæ valvula additoria infima et extima minutissima quasi cellulosa enervis. Gluma bivalvis; exterior lanceolata duplo major, 5-nervis, interior fere linearis, 3-nervis. Gluma major floris inferioris ciliata tantum : superioris vel pedicellata ciliata et secus nervos, utrinque nervi centralis ciliatæ; Gluma interior minor floris inferioris vel sub sessilis ciliata spatium intervenium utrinque nervi medii barbat, interior minor floris pedicellata stricto sensu inferioris simili modo barbata. Paleæ 2, chartaceæ muticæ interior glumæ minora opposita, 1 venia, exte-

rior glumæ majori opposita minor bivenia. Stam. 3. Lodiculæ O? Styli 2. Stigmata penicillatæ. Semen paleis induratis inclusum, vix accretum. Embryo paleæ majori oppositus.

Partium situs et alternatio. Pl. CXXXIX. Fig. 65.

a. Outer minute veinless glume.

b. Inner larger, 3 nerved do.

c. Outer glumaceous 1-valved palea, with 4 rows of hairs in the pedicelled flower.

d. Inner larger 1 nerved palea of hermaph. flower.

e. Outer smaller 2 nerved palea of do. the dots indicate the situation of the nerves and stamina.

Gramen decumbens, vaginis longe et parce pilosis, faucibus ciliatis; stamina inclusa.

An veram *P. ciliare*? Confer. character. in Br. Prodr. 1, p. 192, (48) et Roxburghi Fl. Indica, ed. W. 1, p. 293. His monentibus gluma, Roxb., palea glumacea Br., in floribus ambobus ciliata. Ob fartum situ gluma interior inferior majorque paleæ est valva exterior; confer diagram cum eo P. flavidi infra.

20. *Panicum flavidum*, Retz. P. brizoides Roxb.

Spicæ secundæ, sub spiraliter et alterne in rachim dispositæ, inferiores distantes, superiores approximatæ, multifloræ, floribus distichis inferne planis, superne ventricosis. Gluma bivalvis, biflora inæqualis, valva infer: et exterior rotundata, 3-nervis; superior et interior subconformis major, 7-nervis. Perianthium exterius neutrum, paleis 2, quarum extima glumæ valvis textura omnino similis, ovatis, mutica 5-nervis, lævis, interior membranacea, venis 2 lateralibus intro-marginalibus viridibus. Stam. rudimenta tria.

Per: superum et interius hermaphrodit; paleis 2 quorum interior quoad axis ovatis rugoso chartacea viridis, mutica, ventricosa; inferior membranacea marginibus involutis, bivenia, alterâ inclusa. Stamina 3.

Styli 2. Stigmata penicillata.

Glumarum *nervi.* et etiam paleæ exterioris floris neutris apicibus confluunt et eam paulo infra, *venulis* transversis conjunguntur.

Charactere Brunonis, Prodr. 1, p. 190 (46) omnino accedit, vaginis glabris exceptis, in mea exempla hirsutæ oribus ciliatis.

Partium alternatio. Pl. CXXXIX. Fig. 67.

a. Gluma exterior.

b. ,, interior.

c. Palea exterior glumacea floris exterioris neutrius.

d. Ejusdem palea interior.

e, e, e. Stam. rudimenta.

f. Palea exterior, quoad axis interior, chartaceæ floris hermaphrod.

g. Ejusdem palea interior quoad axis exterior.

h, h, h. Situs staminum.

Jellinghey fluv : September 8th, 1835.

21. *Panicum setigerum,* Roxb. Fl. Ind. 1 p. 302.

Spicæ alternæ patentes distantes. Flores secundi geminati, exterior longius pedicellatus, interior brevius, ambo præsertim interior basi pilis albis subrigidis florum longitudine obsitus.

Gluma bivalvis ; exterior latior, nana, 3-nervis, marginibus membranaceis, postice fere conniventibus ; interior multis major ; lanceolata acutiuscula mutica, 7-nervis, marginibus ciliatis. Perianth. exterius masculum. Palea bivalvis, exterior glumæ interior omnino similis ; interior minor membranacea, venis 2, lateralibus chartaceis. Stam. 3, filamentis brevibus. Lodiculæ cuncatæ 2.

Perianth. interius hermaphrodit *quoad axis obliquum.* Paleæ 2, chartaceæ inclusæ ovales exterior major 3-nervis, breviter mucronulata secus *margines inflexas* læve ciliat. ; interior mutica, binervis. Stam. 3. Lodiculæ 2, majores quam in masculo. Styli. 2, Stigmata 2, exserta penicillata.

Gramen decumbens, internodiis dense pubescentibus, vaginis hispidis, faucibus dense pilosis, foliis basi cordatls rotundatisque, primo aspectu perfoliatis lanceolatis a medio attenuatis ciliatis plus minus crispatis. Spicarum basibus hispidis.

Partium situs et alternatio. Pl. CXXXIX. Fig. 73.

a. Outer broad glume.

b. Upper inner long do.

c. Glumaceous outer palea of male flower.

d. Inner palea of, ditto.

e. Outer, or as to the axis, inner palea of hermaph. flower.

f. Inner of, ditto.

In ripas prope flum. *Jellinghey: Sept. 8th*, 1835.

No good difference is given between this and P. umbrosum of Retz. in Kunth's Agrostog. p. 90.

22. *Panicum glaucum Linn*, Pennisetum glaucum Br. Pr. 1 p. 195 (51); charactere generis optimo. Setaria glauca Kunth Agrostog. 1 p. 149. Charactere generis incompleto.

Spica solitaria cylindrica undique florifera. Flores solitarii (an duorum aliorum abortu) in pedunculi 3 fidi dichotomi pedunculis lateralibus extrorsum, aristus longissimas scabras gerentibus pedunculo fertili nudo: lateralibus "involucris" auctorum. Flos interior vel posticus, antice planiusculus postice ventricosus. Gluma bivalvis biflora antica vel exterior minor lanceolata 3-nervis, interior posticave major latiorque 5-nervis, nervis in ambabus infra glumæ apicem confluentibus. Flos exterior masculus palea exterior glumacea ovata mutica 5-nervis, interior membranacea conformis minor 2-nervis. Stam. 3. Lodiculæ 2, minimæ. Perianth. interior posticumve hermaphrodit postice convexum, antice concavum. Palea exterior major chartacea mutica transverse rugosa, 5-nervis: interior minor membranacea, 2-nervis. Lodiculæ 2, majores quam in masculo. Stam. 3, Styli 2, Stigmata 2, penicillata.

Pericarpium caryopsis, paleis conforme iisque induratis inclusum sed non adhærens; dorso transverse rugosum. Embryo paleæ posticæ oppositus.

Gramen basi decumbens 3 pedale, vaginis glabris, fol. linearibus acuminatis, marginibus cartilagineis scabris; spicis terminalibus floribus glaucescentibus, aristis brunnescentibus.

Legio et ripas *Jellinghey* prope fluv. Gangem : *September 8th*, 1835.

Vix genus proprium; monente Brownio omnia Panici involucellis exceptis. Inter Panica spiculis 3 floris, floribus 2 exterioribus abortientibus magis ponenda.

Partium situs et alternatio. Pl. CXXXIX. Fig. 75.

a,a. Abortive flowers.
b. Outer glume.
c. Inner ditto.
d. Outer glumaceous palea of neuter flower.
e. Inner of ditto.
f. Outer palea of perfect flower.
g. Inner of ditto.

23. *Panicum grossarium* Roxb. Fl. Ind. 1. p. 300. P. *Careyanum* N. ab E. Kunth Agr. 1-89?.

Culmis decumbentibus compressis lineatis vaginis lævibus foliis glabris linearibus margine cartilagineo-denticulat., ligula obsoleta, spicis alternis secundis, rachi communi subadpressis, confertis, rachibus partialibus scabris basi breve setosis, floribus setis obsitis, ternatis, pedicelat., 2 lateralibus exterioribusque quorum unas infernus quoad rachi tabescens; intermedio longius pedicellato 4-6 fariam dispositis, spice terminat sæpe composita. Glumæ muticæ pubescenti hirtæ; gluma exterior minor sed latior 3-nervis, interior convexa carinata 5-nervis.

Floris exterioris neutrius palea exterior glumæ interiori

similis sed plana. Floris hermaphrodit paleæ chartaceæ mucronatæ.

In oryzatis. *Bengal: September*, 1835.

Partium situs et alternatio. Pl. CXXXIX. Fig. 113.

a. Gluma exterior latior.

b. ditto interior.

b. a. Palea exterior glumacea floris neutrius.

c. Ejus palea interior.

d. Palea exterior floris hermaph.

e. „ interior.

Præcedentis varietas est planta sequens discrepans statura minore, foliorum marginibus purpurascent., spiculis patentibus nec approximatis dorso fusco rubris setis paucis flore abortient. magis evoluto, sæpe præsertim apicis spicarum versus perfecto.

Hujus Caryopsis paleis induratis obtectum, adnatum dimedio-ovatum nempe hinc convexum illinc planum acutum submembranaceum; obsolet *dorso* 5-nerve, griseum (punctulis planis) potius brunneo-guttatum. Embryo paleæ exteriori oppositus.

Legi cum præcedent., aquo aspectu differt: *September* 12*th*, 1835.

24. *Panicum paludosum*, Roxb, Fl. Indic. 1-310. Kunth Agr. 1-126.

Gramen basis versus decumbens. Culmis teretibus in vaginis glabris lineatis, ligula ciliatim lacera, fol. lineari acuminatas supra tactu scabras, margine cartilagineo-denticulatis. Paniculis amplis ovatis scabris, divisionibus alternis vel sub verticillatis, paucifloris; floribus geminatis in pedunculo breve communi secundis, inqualiter pedicellatis. Gluma exterior nana lata, marginibus postice approximatis subbruneata membranacea enervis interior submembranacea mutica lanceolata, 7-nervis. Flos exterior, neuter 1 paleaceus. Palea

(exterior) forma venationeque gluma interioris magis membranacea, interior hermaphroditus bi-paleaceus. Paleæ sub æquales muticæ convex subglabræ exterior 7-nervis, interior nervis 2, lateralibus indistinctis. Lodiculæ 2, latæ cuneatæ repandæ, semi-exsertæ e sinu paleæ interioris. Stam. 3. Anth. pulchre aurantiaceæ Styli 2, Stigmata 2, plumosa, pulchre coccineo-purpurei.

Partium situs et alternatio. Pl. CXXXIX. Fig. 127.

a. Gluma exterior e nervis.
b. Ditto interior 7-nervis.
c. Palea exterior (unica.) floris neutrius 7-nervis.
d. Palea exterior floris hermaph. 7-nervis.
e. Ditto interior binervis.
f, *f*. Lodiculæ semiexsertæ.
g, *g*, *g*. Stamina.
h, *h*. Stigmata.

Legi in oryzetis supra *Sheerazgunge*: *September* 19*th*, 1835.

25. *Panicum*. Culmo basi radicante prostrato vaginis intermediis paullo breviorib : secus marginem externum (mutuo alternantem) ciliatas; foliis lanceolato-acuminatis basi cordatis, margina cartilagineo scabro stomatibus utrinque venular. 1, seriatim dispositis, panicula terminal. rachi subalata, spicæ plurifloribus secundis flosculis inferioribus germinatis; horumque interior brevioreque pedicellato 1, 2 infimis tabescent, superioribus solitariis.

Glumæ distantes; exterior paullo minor subcuspidata: membranacea nervis 3, viridibus ut etiam cuspis quæ terminato nervi medii interior major conformis nempe lanceolat. ovat. magis viridis 5-nervis, cuspida obtusiore obsoletioreque, flosculus exterior bipaleaceus, exterior glumæ interiorum similis, interior membranacea hyalina, binervis, ciliata secus nervis. Lodiculæ 2, cuncatæ integræ. Stam. rudim. 3.

Interior hermaphrodit. plano-convexus. Paleæ lanceolatæ;

rugosulæ vel potius punctulatæ, exterior apice cuspide falciformi breve viridi donat 5-nervis, marginis apicem versus breviter ciliatis interior.

Stam. 3.

Lodiculæ cuneatæ, conduplicatæ extrorsum margine paleæ baseos in sinui intranti.

Styli 2. Stigmata plumosa ratione styli æqualia rami denticulati sæpius simplices.

In sylvam *Suddya. Decr. Jany.* 1*st*, 1836. *It Ass.* 286.

Dispositio stomat. glumarum paleæ exterioris floris castrat. omnino ut foliis.

26. *Panicum*, Culmo decumbente vaginis pubescentibus ligulis minimis, collis callosis!

Paniculis ovatis, ramis divaricatis, rachillis sæpius flexuosis basi glandulosis ? flosculis ovatis uniglumaceis ? obtusis, viridibus.

In sylvis inter *Nunklow* et *Nowgong* : *Novr.* 18*th*, 1835. *It. Ass.* 270.

27. *Panicum arcuatum*, Br. Prod. 1-189 (45) Kunth Agr. 1-77 ?

Gramen gracilo-filiforme, parte erecta 1-2 pedale ; culmis glabris, vaginis laxiusculis collo glabris, ligula sub O. fol. linearia, basi subsimplice, acuta lævia, marginibus cartilagineis subglabris. Spica solitaria cylindrica ; floribus solitariis breviter pedicellatis undique imbricatis.

Gluma exterior glabra membranacea superiore interiore duplo triplo minor, marginibus postice incumbentibus, 3-nervis. Interior multo magis herbacea acute mutico sursum arcuata hispida, 9-nervis. Palea exterior floris neutrius exterioris basi gibbosi huic conformis sed recta.

Interior minima convoluta ovata obtuse vix binervis.

Lodiculæ 2 rotundatæ quoad margines. Stam. rudim. O.

Floris interioris hermaphrod. paleæ lanceolatæ muticæ obtusæ, hyalinæ exterior sub-enervis, nervis indistinctis centrali evidentior, interior binervis et indistincta.

Lodiculæ nullæ ! an semper.

Stamina 3.

Stigmata plumosa ratione styli breviuscula. Caryopsis (immature) lanceolat æqualis, lævia albida.

Panici vix legitima species, an distinguenda ob flores arcuatos. Paleam exterior floris neutrius basi gibbosum. Lodicularum præsertim in huic et absentium in hermaphrodito.

28. *Panicum arcuatum*, Br. Pl. CXLVII. Fig. 1. vide predecent.

Genus novum constituere videtur ut prius loc. cit judicavi.

Locustæ arcuatæ subulatæ bifloræ.

Gluma bivalvis mutica inæqualis membranacea, valva exteriori minori, interiori arcuato.

Flosculus exterior neuter bipaleaceus muticus. Palea exterior maxima glumacea. Lodiculæ 2. Staminum rudimenta 2 !

Interior hermaphrodit ratione glumæ interiores minimus, bipaleaceus muticus. Paleæ subæquales chartaceo-membranaceæ. Lodiculæ nullæ !. Stamina 3. Ovarium stipitatum. Styli basi ima coaliti. Stigmata plumosa.

Caryopsis paleis cartilaginea chartaceis vestita lævis.

Gramen erectum sesquipedale, fol. linearia acuta, ligula brevissima. Panicula spicata, spiculæ bi-plurifloræ.

Gluma exterior 5-venia. Interior 9-venia. Palea glumacea floris neutrius apice emaginata et membranacea, 8-venia. Venula nempe centralem et primam lateralium latere uno interjecta!

Palea exterior fl. herm. 3-venia, interior bivenia, Locustæ raro glabræ.

Panico proximum discrepans locustis curvatis staminibus imperfectis flos. neutrius 2, et absentia lodicularum floris hermaphrodit.

Isachne.

Isachne geniculata Gr.

1. Gluma bivalvis, bi-flora membranacea mutica, valva inferior convexiuscula, 5-7-nervis ; superior ventricosa, 11-nervia, ambæ hispidæ, pilis rigidis brevibus, viridis marginibus membranaceis.

Flos exterior masculus, oblongus planiusculus. Paleæ 2, ellipticæ : obtusæ ; exterior glumacea, 5-nervia, nervis lateralibus indistinctis, interior conformis minor ; (calceolariformis) binervis.

Lodiculæ 2, minimæ carnosæ. Stam. 3, rudiment. quorum *externum magus*, filamentorum tantum minima. Flos superior dorso ventricosus antice planus fæmineus. Paleæ muticæ chartaceæ, exterior orbicularis ; nervis indistinctis obsoletis ; interior minor conformis, binervis. Lodiculæ 2, carnosæ ut in masculo. Styli 2, stigmata plumosa, ratione styli sublonga, denticulata.

Gramen parvulum elegans, basi decumbens radicansque articulis hirsutis tumidis, vaginis brevibus, pubescentibus, fauci-ciliato-barbatis (potius ligula lacera), fol. brevib. lanceolatis, basi subamplexicaulibus, hirtis marginibus, subsimplicibus scabris. Panicula tenui, ovatâ, vix omnino exsertâ, sublævi, floribus solitariis quasi bilabiatis, pedunculis basi subcartilagineis, basi prope, ut etiam pedicelli, infra medium, articulo ? cartilagineo tumido.

Panico proximum genus : discrepans flore supero fæmineo, cum staminibus rudimentariis.

P. trichoidi, exempli gratia quam maxime affinis.

Situation and alternation of parts Pl. CXXXIX. Fig. 206.

a. b. glumæ.

c. Palea exterior, subglumacea floris masculi.

d. ,, interior.

e. Palea exterior ventricosa floris fæminea.

f. „ interior.

Bengal Prope Osunpoor : September 27th, 1835.

2. *Isachne stigmatosa,* Gr. Pl. CXLVIII. Fig. II.

Planta elegans basi decumbens, radicansque parte erecta spithamæa pedali, culmorum subsimplicium articulis geniculatis, tumidiusculis glabris, vaginis brevibus uncialibus limbo brevioribus marginibus ciliatis, collo pilis longis ciliato, (potius ligula libera nulla nitida, ciliata) fol. lanceolato-acuminata, basi sub cordata, ibidemque utrinque ciliis setosis paucis, acutiuscula, supra lineis elevatis creberrimis striata, utrinque tactu retrorsum asperrima marginibus cartilagineis antrorsum denticulatis. Panicula subovata effusa tenua ramisque alternantibus sub-opposit. capillaribus flexuosis scabra, ramulis bifloris, ad insertiones supra glandulosis, *continuis* capillaribus flexuosis.

Glumæ ovatæ parce minuteque pubescentes, muticæ obtussissimæ inferior 7-nervis, paulo longior planiuscule superior ventricosa ; 9-nervis, ambæ marginibus membranaceis hyalinis.

Flosculi dissimiles inæquales ; exterior (inferior) paulo longior masculus planiusculus. Paleæ membranaceæ obtussimæ, sub-diaphanæ, exterior marginibus parum involutis sub 7-nervis, nervo centrali tantum distincto, nervis interior conformis, sub-binervis, nervis omnino parum distinctis, Lodiculæ 2, triangulari-cuneiformes, sub-emarginatæ, subrepandæ ; semi-exsertæ. Stamina. 3.

Flosculus superus plano-ventricosus sub-hæmisphæiricus, dorso clypeatus. Paleæ muticæ obtusissimæ, chartaceo-membranaceæ, exterioris marginibus parum involutis, indistinct 5-nervis, nervo centrali magis distincto, secus marginem vel partem intra-marginalem inflexam dense ciliata, pubescens interior conformis, minutisissime pubescens, planiuscula. Lodiculæ 2, stamina rudimenta nulla, vel minima.

Styli 2, ima basi subcoaliti., longitudine paleam internam paulo superantes. Stigmata ratione styli longissima paleam internam 2½ superantia, plumose pulchra, rubra, ramis longissimis subulatis, sæpius simplicibus; interdum bifidis.

In humidis super inundatis; ad ripas flum. *Boorea Barak* paulo infra *Luckipoor*: *October* 3*rd*, 1835.

Species videtur intermedia *Isach. miliaceam et pulchellam* (Roth) Culmis subsimplicibus; ad nodos glabris, vaginis margine ciliatis collisque barbatis, fol. lanceolato-acuminatis basi cordatis, utrinque asperis, panicula effusa capillario-scabrella; ramulis bifloris, glumis subæqualibus, flosculo masculo fæmineum superante; floris fæmin. paleis minute, pubescentibus; exterioreque ciliata.

Lodiculæ famineæ floris cito membranacæ fiunt et marginibus approximatis complanatisque quasi coalitæ videntur.

ORTHOPOGON.

1. *Orthopogon,* Gramen ramosum basin versus decumbens radicans, internodiis vaginas pubescentis paulo excedentibus pubescentibus vaginis ciliatis, ligulis ciliatis, fol. lanceolato-acuta, pubescentia, longe ciliata. Inflorescentiæ axis pubescents ramis quam maxime divaricatis, alternantibus subsecundis, pubescentibus pilisque rectis longis hispidis.

Floribus in his spicatim dispositis secundis, geminatis infimo cujusque paris sæpe tabescent. in pedunculum brevissimum articulatis.

Glumæ virides membranceæ extern. densior lanceolatæ ovatæve, externa pubescents 5-nervi longe aristata, arista rubra lævi, cartilaginio-crassa, paleam 3 plo excedent., interna latior 7-nervis, ciliata, pubescens infra apicem paulo simili modo aristata, arista brevi paleam nec æquante. Flosculus exterior neuter bipaleaceus, palea exterior glumacea ovata, pubescens, infra apicem paulo breviter mucro-

nata, 9-nervis, interior, minor hyaline lanceolata acuminata, binervis; Interior hermaphrodit.

Glumæ coriaceæ lanceolatæ acutiusculæ muticæ exterior 5-nervis, interior 2-nervis. Stam. 3. Styli 2, longi. Stigmata 2, plumosa longissima. Caryopsis lævis, paleis induratis arcte inclusis, albidis.

In sylvis *Suddyah: January 8th*, 1836. *Orthopogan Br. Prodr. It. Ass.* 303.

SETARIA.

1. *Setaria glauca*, Pl. CXLIX. Fig. I.

Culmis basi decumbentibus; fol. subdistichis supra subglaucis linearibus angustis basi simplicibus, vaginis compressis et carinatis, ligulis laceris, spica cylindrica 1½ unciata.

Involucri setæ aristæformes, antrossi denticulati hinc pedicelli brevis paginæ marginibus posticis ortæ; locustæ aliquando tabescentes, bifloræ. Glumæ muticæ, 3-venia exterior minor. Flosc. exterior masculus rarius neuter bivalvis muticus; valva exterior glumacea, 5-venia. Inter hyalina bivenea. Stam. 3. Lodiculæ 2, oblongæ integræ.

Interior hermaphrodit, convexo-planus, paleæ muticæ cartilagineæ, exterior transverso- rugosa.

Stam. 3, Lod. 2, ut in masculo. Stigmata penicillata ramis subintegris simplicibus.

Cuticula utroque stomatosa, cellulis rectis difformibus! his nempe cutis inferioris parellogrammicæ angustæ illis hexangulis; latioribusque.

Ad ripas *Brahmaputra: March* 31*st*, 1836. *It. Ass.* 465.

SPOROBOLUS.

1. *Sporobolus*, Pl. CXLIX. Fig II.

In cæspitibus densis parvis tenacissime adhærens. Culmi basi decumbentes, pedales vel sesque pedales articulis inter-

dum geniculatis, valde tumidis glabris. fol. linearia angusta, sicca involuta valde acuminata ligula obsoleta, collum imberbe.

Panicula spiciformis, spithamæa spiculæ alternantis breves, adpressæ secundifloræ, compositæ, apice simplices.

Locustæ articulatæ in apice pedicelli glabratæ apice delatati unifloræ, secundæ cylindraceo subulatæ. Gluma bivalvis inæqualis membranacea, valvis denticulatis ovato-oblongis exteriore minori evenia, interiori vena centrali quam maxime obsoleta.

Paleæ membranaceæ, muticæ, leviter striatæ; persistentes immulatæ exterior angustior concava, incomplete 1-venia, interior magis concava, marginibus subhyalinis incomplete bivenia.

Lodiculæ 2, magnæ, carnosæ, obliquæ, antici triangulares, semi-inclusæ, palea interiori, 1-veniæ.

Stam. 3, filamentis longe exsertis crassis, antheraque marginibus rubro-purpureis, cæterum albis.

Ovar. breviter stipitat. Slyli 2. Stigmata ratione styli longa, ramis paucis valide denticulatis etiam bifidis.

Fructus paleis inclusus. Pericarp. oblongum apice base stylorum brevissime apiculat, carnosum facillime solubili, areolatum rubrum; areolarum margines albi, centrum puncto albo. Pars pericarpii paleis opposita et amplexa vix colorata.

Albumen membrana solubili (a pericarpio) inclusum. Embryo, paleæ exterior opposit. scutellum levido purpur. Vaginæ 2, inferior membranacea, dentata, superior carnosa, involuta plumulam omnino amplectens.

Suddyah et alibi communis: *April* 12*th*, 1836. *It. Ass.* 479.

2. *Sporobolus*, Culmis erectis 2-3 pedalibus, basi foliorum vaginis pseudo equitantibus vestitis compressiusculis, fol. angusta linearia apicibus longe subulata; ligula obsoleta vaginis ciliatis, panicula cylindraceo-filiformis, composita, ramis multifloris adpressis, floribus secundis inferior ternatis, mediis geminatis, pedicellis inæqualibus, terminalibus, solitariis.

Glumæ membranaceæ muticæ, exterior minor enervis apice denticulata, interior enervis, consistentia palearum. Paleæ muticæ æqualis diaphani muticæ exterior nervo centrali indistincto, interior indistinct et incomplet binervis, nervis approximatis apice versus sub-bicarinata.

Lodiculæ obcordatæ, Stamina 3, Styli 2, Stigmata plumosa ratione stylorum longissima.

In gramenosis humidis *Chattuc*: *October* 6*th*, 1835. *It. Ass.* 8.

3. *Sporobolus diander.* Pl. CXXXIX. Fig. 85.

Agrostis diandra, Roxb. Fl. India, ed. W. 1 p. 319. Sporobolus, Br. Prod. 1 p. 169. (25) 170 (26). Sporobolus diander Br. Kunth Agrostog. 1-209. Cujus characteri generis planta indica vix accedit.

Inflorescentia paniculata, spicis secundis. Flores stipitati incurvis divisione paniculi vel in spicis, dispositione diversi, inferiores nempe plures in pedunculo communi, intermedii 2-3, in pedunculis ; superiores solitarii. Gluma uniflora, bivalvis, inæqualis mutice evenia, valva exterior duplo minor, ambæ obsolete denticulatæ. Paleæ 2, conformes subæquales muticæ, vix chartaceæ ovatæ exterior nervo centrali obsolet. ; interior nervis 2, lateralib. obsoletis infra medium evanidis.

Pericarpium obovatum ; membranaceo-cellulosum, laxum solubile.

Gramen 1-2 pedale, fol. linearibus ligulis obsoletis, paniculæ ramis subverticellatis.

Partium situs et alternatio. Pl. CXXXIX. Fig. 85.

a. Gluma exterior.

b. Ditto interior.

c. Palea exterior.

d. Ditto interior.

Arundo.

1. *Arundo*, Roxburghii Kunth Agr. I. 248. A. Karka Roxb. Fl. Ind. 1-348.

Gramen procerum 16 pedale, elegans. Culmi subsimpli ces, fistulosi; fol. bifaria subpendula, vaginis culmi partem foliosam omnino vestientibus viridibus margines versus lutescento-albidis, glabris; collo utrinque sed præsertim fissuram prope, dense ciliato-barbato Ligula obsoleta ciliata. Panicula maxima subsecunda, e basi nutante pendula, ramis subverticallitis ramulisque alternis gracilibus ad insertiones glanduloso-callosis pilosisque angulatis scaberrimis, fol. lanceolato-linearia longissime acuminata, coriacea glabra marginis subsimplicibus antrorsum denticulatis, spiculis in pedicellis gracillimis solitariis.

Glumæ membranaceæ, acutæ muticæ inæquales, flosculis brevior, externe minor 3-nervis, obtusiusculis, anterior *valdique superior*, acute nervis 3, magis distinctis. Flosculi 4-5, imo basi nudo masculo sæpissime diandro, distantes; reliqui basi pilis longis involut. Palea inæqualis membranacea, exterior maxima longissime lanceolata. Convexa subulato-acuminata, 3-nervis, interior nana 3-plo brevior, plana integra acutiuscule subciliata secus nervos duos laterales.

Lodiculæ 2, subfalcatæ. Stamina 2-3. Styli 2. Stigmata plumosa ratione styli longa.

Flos infimus musculus sæpissime diandrus, nudus ut omnes alii hermaphroditi, quorum *rachis* tantum villosa.

Erecta 14-16 pedalis, fol. bifariis collis ligulisque obsoletis ciliatis, panicula nutante pendula. Locustis sub 4-floris glumis inæqualibus, flosculis multo brevioribus, flosculo infimo masculo diandro, nudo!

Situation and alternation of parts Pl. CXXXIX. Fig. 243.

a. Glume exterior.

b. „ interior.

c. Palea exterior floris infimi masculo.

d. „ interior.

e. Flosculus secundus hermaphrodit.

2. *Arundo.* Gramen quam maxime varians statura nempe 2-10 pedale, paniculis laxis nutantibus, plumbeis, foliis angustis apicibus pendentibus.

In collibus inter *Myrung et Nunklow: Novr.* 14*th,* 1835. *It. Ass.* 251. 159.

3. *Arundo.* Panicula nutanto pendula secunda foliis erectis. Inhumidis inter *Myrung et Nunklow*: *Novr.* 14*th,* 1835. *It. Ass.* 251. *a.*

4. *Arundo.* Gramen elatum. 6-8 pedale. Culmis superne foliisque infra glaucescent, fol. recurvato-patentibus, vaginarum collis barbatis. Panicula, nutans ramis basi incrassatis quasi glandulosis sparsis, nutantibus. Panicula cinerea plumbei-nitida.

Gluma membranacea subæqualis distantis flosculis multo, duplo brevioris 1-nervia saltem interior quæ etiam carinata. Palea exterior 3-nervis: lanceolata subcarinata infra apicem bifidim aristata, arista, palea duplo brevior scabra, infima sterilis mutica! Rachi inferne villis brevissimis donati.

Palea exteriore longissime ciliata, interior sub-bicarinata, carinis scabro-denticulatis. Stam. 3, lodiculæ cuneato-oblongæ apice ciliatæ. Flosc. summus tabescens species distincta.

In Graminosis, *Churra Ponjee: Oct.* 26*th,* 1835. *It. Ass.* 175.

5. *Arundo. sp.* A. Karkæ Affin.

Gramen procerum: in locis idoneis *humidis* 16-20 pedale. Culmis farctis: basin versus vel senioribus? fistulosis diametro unciali, ramosis sublignosis.

Folia plana, 2½ pedalia, coriacea patulo, pendula, ensiformia longe acuminata, margine cartilagineo: antrorsum denticulata, glaucescentia, superne parce pilosa, basi barbata, vaginis ciliatis, ut etiam ligulis.

Panicula culmum terminalis maxima, apice nutans divisionibus vel pendulis, vel nutantibus, 3 pedalis et ultra; brunneo-alba, subsecunda, his ramos terminantibus multoties

minoribus. Axis glaucescens, divisiones sparsæ; basi, cartilagineo-incrassatæ, spiculæ inferiores cujusque ramuli compositæ, vel potius ramulo ultimato basilari-diviso, summis simplicibus spiculam unam gerentibus, priorum infimæ plus minus tabescent. 6 floris, 3 iis incompletis.

Glumæ membranaceæ, fuscescentes muticæ, acutatæ inferior incompleto 1-nervis superior fere completa. Flosculus infimus, ideoque glumæ exteriori oppositus tabescens fere nudus 1 paleaceus, palea (exterior) membranacea obtusiuscula, angusta oblonga, quam convoluta, 1-venia, vena apicem infra desinenta. Flosculi sequentis 3, vel 4 fertilis evoluta.

Palea exterior lanceolata sub navicularis membranacea hinc utrinque barbata pilis palea paullo brevioribus aristato acuminata 3-venia, arista brevi subulato-dentata. Interior hyalina paulo brevior apice bidentata sub-bicarinata (bivenia) secus carinas denticulata. Stam. 3, filamentis anthera paulo brevioribus. Lodiculæ Styli 2. Stigmata 2 plumosa. Flos. summus tabescens paleæ exteriori redactus. Rachilla barbata breviter. Palea exterior intro-marginaliter et venis lateralibus parallela a basi medium ultra barbata, ramis culmi basi squamis vaginatis. *Suddyah* alibique per totam regionem fluminis *Brahmaputra*: "*Poodo Molee*" indigenum. *Jan.* 9*th*, 1836.

A. culmis ramosis vaginis ciliatis, fol. ensiformibus acuminatissimis supra glaucis pilosis basi barbatis, ligulis barbatis, panicula effuse nutante subsecunda, spiculis sub bi-floris, flosculo infimo summoque tabescentibus, 1 paleaceis, palea flore fertilium exteriore breve aristata, intro-marginaliter barbata. *It. Ass.* 300.

6. *Arundinacea, sp.* Pl. CLVI. Fig. II.

Spiculæ compressæ (aristis inclusis 3. linealis) 6-floræ; flore infimo vacuo unipaleaceo, summo tabescente.

Glumæ distantes, membranaceæ, fuscæ, acutatæ, 3-veniæ, venis approximatis apicem infra evanidis, centrali paullo carinata, scabrella, superior paullo major. Rachilla articulata medium versus inter quemque florem. parte articuli infra

gracili glabra, superiori clavata pilis brevibus hispida.

Flos infimus unipaleaceus, palea glumis omnino similis sed major.

Paleæ exterior floris hermaphrodit, membranacea concava carinata, carinâ scabrâ; in aristam scabram rectam, fuscam, palea sub 3 plo breviorem continuatâ, 3-venia; venis lateralibus minute scabrellis, pilis longissimis hyalinis simplicibus tenuissimis dense *ciliato* hispido sericeo; *apice acute emarginata.*

Palea interior subhyalina, brevior, bicarinata, carinis scabrellis.

Lodiculæ 2, oblongo-ovatæ, emarginatæ. Stamina 3. filamentis antheris linearibus 3-4-plo brevibus, basi ovar. stipito-adnatis. Pollen. læve inæqualia.

Ovarium. glabrum, stipitatum; Styli distinct. Stigmata plumosa; ramis dentatis, ratione stylorum longissimum (3 ½ longiora.)

Panicula ampla, ramis filiformibus pendulis nutantibusve scabrellis. *It. Ass.* 2.

CYNODON.

1. *Cynodon Dactylon*, Pers. Kunth Agros. 1-259. Pan. Dactylon Lin. Roxb. Fl. Ind. 1-298.

Gramen parvulum decumbens, fol. distichis linearibus acutis, vaginarum faucibus ciliatis. Culmis vaginis a medio infra undique obtectis. Spicæ digitatæ, 4-5-ascendentes, rachi 3 angulares, undulati; flores breviter pedicellati, alternantes, solitarii secundi.

Glumæ respectu axeos rectæ, sinistræque sub æquales angustæ carinatæ, carina scabra exterior minor, interior lanceolata. Palea exterior navicularis sub carinata acuta, carina ciliata præsertim apicem versus vix 3-nervis marginibus incrassatis, interior minor bicarinata acuta, carinis minute denticulatis.

Pericarpium *liberum* ovatis, obtuse apiculatum læve, albidum, bruneo notatam, Rudiment. floris secundi stipitiforme, inter carinas paleæ interioris receptum flore perfecto brevis.

Situation and alternation of parts Pl. CXXXIX Fig. 204.

a. Glumæ exterior.

b. ,, interior.

c. Palea exterior.

d. ,, interior.

e. Rudiment stipitiforme.

P. Lineare Roxb. vix hujus synonymum.

Gluma superior, vix exterior quorum flores, distichi secundi.

Jumalpore: September 23*rd*, 1835.

Eleusine

1. *Eleusine ægyptica*, Roxb. Fl. Indica 1, p. 345. Dactyloctenium ægyptiacum Kunth Agr. 1, p. 261.

Spicæ digitatæ radiatim patentes, secundæ rachis angustæ dorso convexæ; locustæ paucifloræ arcte confertæ et distichæ, antice posticequæ valde compressæ. Flores distichi. Gluf ma bivalvis navicularis inæqualis, valva exterior (interior Kunth) mutica paulo minor 1-nervis, interior 1-nervis, nervo in aristam brevem producto. Paleæ 2, membranaceæ exterior carinata navicularis 1-nervis, nervo medio in apiculum brevem producto; interior bicarinata apice bifida binervis, carinis scabris. Lodiculæ 2, carnosæ, cuneatæ paleis alternantes. Stamina 3. Styli 2, ima basi coalita. Stigmata plumosa.

Gramen 1 pedale, basi decumbens, vaginis lævibus faucibus ciliatis, fol. linearibus pilosis spicis subquinis

Locustæ infimæ 1-2 floræ? Flos summus cujusque locustæ ex Kunth tabescent.

Partium situs et alternatio. Pl. CXXXIX. Fig. 79.

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a. Palea exterior.

b. ,, interior bicarinata.

c, *c*. Lodiculæ 2-paleis alternantes.

d, *d*, *d*. Stamina.

e. Ovarium et situs stylorum.

2. *Eleusine indica*, Gært. Roxb. Fl. Ind. 1. 346. Kunth Agros. 272 ?

Gramen cæspitosum, basi decumbens. Culmis compressis, vaginis subglabris, fol. linearib acuminatis, carinatis, basim versus plus minus conduplicatis et ibidem longe parceque pilosis. Spicis vel radiatis subquaternis, vel pluribus alternis, terminalibus tantum verticillatis, linearibus secundis, basibus parce pilosis. Rachi dorso angulati 3-angularis, angulo tertio postico.

Spicæ secundæ locustæ distichæ arcte imbricatæ, compressæ, paucifloræ.

Gluma bivalvis inæqualis mutica carinata compressa, membranacea, valva interior (exterior respectu axeos) major 5-nervis in robusta 7-nervis, nervis viridibus lateralibus incompletis, carina denticulata, marginibus membranacea interior quoad rachim, inferior minor 1-nervis, nervo completo denticulato.

Rachilla parum flexuosa.

Paleæ 2, mutuæ, membranaceæ, inæquales, exterior major, carinata, carino-scabra 5-nervis, nervis lateral. paululum infra apicem desinent. Interior minor bicarinata, carinis scabris binervis.

Lodiculæ 2, ovatæ subdenticulatæ. Stamina 3. Styli 2. Stigmata plumosa, ratione styli sublonga.

Caryopsis oblonga.

Legi prope *Jumalpore: September*, 18*th*, 1835.

Alternation and situation of parts Pl. CXXXIX. Fig. 156.

a. Palea exterior 5-nervis.

b. ,, interior bicarinata.

c, *c*. Lodiculæ.

d, *d*, *d*. Stamina.

e, *e*. Stigmata.

2*a*. *Eleusine indica*, Pl. CL. Fig. I.

Cæspitosa; culmis valde compressis. fol. distichis linearibus conduplicatis, supra pilis longis albis parce pilosa ut vaginæ, collis pilosis, ligulis brevibus sublaceris, spicis digitatis, uno superaddita, infimo solitaria, fere sessilis, insertionibus glandulosis, rachi 3 angulari, locustis unilateralibus, compressis, distichis, 4 floris, fl. sumos tabescente. Gluma inferior, interior quoad axim minor, ambæ muticæ, carnis scabris. Paleis muticis inferiore ⅓ longiore, muticis carinis scabris. Caryopse oblonga, hinc gibba paleæ exteriori opposite.

Ad ripas *Brahmaputra*: *March*, 31*st*, 1836.

Eodem cum, Eleusine numo 2 p. 52. Cutæ utriaque stomatosa.

AIRA.

1. *Aira*, *Sp*. Pl. CXLI. Fig. II.

Spiculæ inferiores ternatæ, reliquæ geminate, inæqualiter pedicellatæ terminali solitariâ, bifloræ, flosculis sessilibus.

Glumæ; chartaceo-coriaceæ, concavo-carinatæ, muticæ; inferiori minori 3-venia, carina scabra, superiori 5-venia, carinæ lævi.

Flosculus exterior masculus cæterum hermaphrod. in paniculæ inferiore parte. Paleæ 2, exterior glumacea, membranacea mutica, concavo-navicularis, 5-venia, venis lateralibus approximatis, venulæ 2 incompletæ, interjectæ supra medium intervenium centralem et laterales intermedias, margines. Interior subciliata plana membranacea bicarinata hirta, carinis apices versus scabrellis, marginibus ciliatis.

Lodiculæ 2. Stamina 3.

Ovarium styli stigmataque rudimentaria, perfalave. Flosculus ut in flosculo superiori, interior hermaphroditus, ratione exterioris duplo 3 plove minor, basi pilis. Palea obsitus exterior chartacea convoluta navicularis scabrida fusca, 1-venia apice longe aristata, arista fusca basi plana glabrata cæterum teres scabra palea 2-3 plo longior.

Interior minor plana, bicarinata fusca glabra, bivenia.

Lodiculæ 2, sub cuneatæ emarginatæ. Stam. 3, antheris semi-exsertis. Ovarium sesile rotundum glabrum. Styli 2, basi coaliti. Stigmata plumosa, ramis denticulatis.

Caryopsis paleis et embryorum parallela compressiuscula, paleis circumcincta libera angusto-lanceolata, lævis ; stylorum basi apiculat, albida. Embryo paleæ interiori oppositus.

Panicula erecta hirta vel hispida ramis sub verticillatis simplicibus.*

Ambigit. Panicum et Ischæmum inter.

An Airæ species, proximâ quoad genus numo 3. page. 55.

Gramina spiculis bifloris rudimento tertia nullo interjecto prope Paniceâ sectione locanda, præsertim propter florem inferiorem sæpe imperfecte evolutum.

2. *Aira viatica*, Gr. Pl. CXLV. Fig. II.

Spiculæ inæqualiter pedicillatæ, 2-4 aggregatæ bifloræ similes.

Spicæ binatim ternatimve digitatæ 3-4 uncialis ascendentes, rachis rachillisque hirti-scabris. Glumæ 2, muticæ, dissimiles, latissimæ, exterior minor convexa, basi subgibbosa, membranacea 3-venia, venis scabrellis mucronata arristata, arista scabra. Interior duplofere major, convexa, acutata 5-venia ; venis lateralibus per totam longitudinal, nec ne crista apice truncata cartilaginea ? transverse secus faciem interiorem sulcatâ margine pilis longis hispido, ciliato-appendiculata.

Flosculus inferior (exterior) masculus.

Paleæ 2, muticæ, exterior aliquoties major membranacea, subglumacea, concava, 5-venia ; marginibus, subciliatis.

Interior subhyalina, profund bipartita, sinu nudo vel. lobulum dentiformem grandiuscula gerente, bivenia, marginibus involutis basi versus auriculatis, auriculis conniventibus apice subciliata.

* It is important always to examine the flowers of the upper portion of the Panicle.

Lodiculæ 2, Filam. vestigia 3. Rud. ovar. nullum.

Flosc. superior minor hermaphroditus.

Paleæ 2, membranaceo-chartaceæ, exterior major concava, 5-venia, apice producto in aristam scabram, paleam subæquantam rectam.

Interior plana, apice integra, bivenia, marginibus involutis, basin versus utrinque auriculatis.

Lodiculæ 2, oblique cuneatæ, denticulatæ, margine supero fisso.

Stam. 3, filam. rudimento tantum vide. Ovar: obovate glabrum. Styli 2, umbone conico conspicuo interjecto.

Stigmata plumosa, ratione stylorum longa, (3 plo excedentia.)

Caryopsis paleis inclusa, libera, lævis, oblongo-elliptica utrinque rotundata, breviter stipitata stylorum basibus et umbone terminata.

Embryo paralleli compressus, paleæ exteriori opposit! maximus.

Gramen erectum 1-2 ½ pedali, vaginis pubescent. foliis. ciliatis.

Ligula obsoleta, culmi spicæque cano-pubescentis.

Ab Ischæmo distincte, glumæ exterioris crista, palea glumacea floris masculi et glumarum consistentia; a Panico vix separandum.

Panicum viaticum Nob. MSS. *It. Ass.* 178.

Advias raro *Churra Punjee: October* 18*th*, 1835.

3. *Aira, sp.* Pl. CXLVI. Fig. III.

Spiculæ breviter pedicellatæ, 2-4 cuique spicæ (specis in paniculam ovatam densam erectam subcapitatam contractis,) bifloræ compressiusculæ.

Glumæ subdistantes inæquales, acutato-aristatæ, carinato-naviculares, aristis scabris præsertim superior quæ multo major, membranaceæ, exterior 3-venia carina venisque lateralibus scabris, superior 5-venia, carina scabrella cæterum lævis.

Flosculus infimus in paniculæ partibus inferioribus neutris, superioribus hermaphroditus.

Paleæ 2, muticæ. Exterior multo major, integra navicularis mucronato-aristata subcarinata, carina scabra, apice margine hirtellæ, 5-venia, venis lateralibus approximatis cum centrale transverse apicem paleæ versus coalitæ, venula intermedia aliquando decurrente.

Interior hyalina, plana marginibus parum involutis, apice marginata et ciliata bivenia, venis scabrellis.

Lodiculæ cuneatæ, bi-tridentatæ saltem si masculus.

Stam. 3, filamentis longis, antheris ovatis brevibus.

Ovaria oblongo-ellipticum glabrum, longe stipitata. styli 2, ex ima basi divaricati. Stigmata plumosa, rami simplices dentata. Palea floris ultimi semperque hermaphroditi dissimiles, stipite pilis breviusculis obsito, exterior navicularis, dorso pilosa, a medio supra longissime aristata, arista medium infra sub geniculata, genicula infra complanata glabrataque recta, lateribus sursum productis in acuminibus longis fere aristatis, 3-venia, venis lateralibus in alam excument., transverse cum centrali nexis. An Danthonia ?

Interior plana, apicem versus dilatata, integra, bivenia, intervenio piloso, pilis inferioribus parvis, summis maximis cellulos referentibus divaricatisque apice ciliata.

Lodiculæ etc ut in flore inferiori. *It. Ass.* 5.

4. *Airæ* ? Pl. CLV. Fig. III.

Spiculæ sæpius geminatæ inæqualiter pedicellatæ, altera breviter, altera longe: in panicula spicæforma linearem nutantem disposita unifloræ, basi pilis brevibus obsitæ, articulata in pedicellorum apicibus sub cyathiformibus.

Glumæ, sub muticæ acutatæ, subchartaceæ, obsoleto-carinatæ, 3-veniæ, venis scabris, inferior paullo minor.

Flos sessilis. Palea exterior chartacea, convoluto-concava apice in aristam rectam longissima, paleam 3 plo superantem scabram continuata, 3-venia, venis sublævibus.

Interior hyalina, membranacea, plana, integra, bivenia.

Caryopsis paleis obvoluta, præsertim interiori lineari-oblonga, lævis, sessilis, apice stylorum basibus coronata, vix compressa. Embryo palea exteriori opposit.

Stigmata plumosa, ramis filiformibus simplicibus denticulatis: marcesa tantum vidi.

5. *Airæ?* Pl. CLVII. Fig. 1.

Spicæ geminatæ arcte approximatæ in spicam cylindraceam; facillime fragiles subbiunciales. Rachis articulata, (articulis bifloris) dorso centraliter villosis basique pilis brevioribus hirtis.

Spicula altera sessilis, altera inferior, si pedicelli originem versus spectes, breviter pedicellata utraque biflora.

Glumæ dissimiles, coriaceo-chartaceæ, exterior dorso, plana; venoso-striata præsertim apicem versus et præcipue spiculæ stipitatæ, marginibus denticulato-hispidis.

Gluma flos spiculæ stipitatæ brevior, obliquam. Interior: carinata, navicularis minor, acutata 3-nervia, apicem versus papillis scabra.

Flos exterior bivalvis hyalinus; marginibus involutis. Palea exterior lanceolata, lata acuta 3-venia, venis centralibus, incompleta et in spicula stipitata saltem deficit. interdum: marginibus hispidulis.

Interior angustior bivenia marginibus minute denticulatis Lod. 2 cuneatæ, denticulatæ. Stam. 3.

Flos superior spiculæ stipitatæ masculus bivalvis lævis hyalinus. Palea exterior latissime, marginibus valde involutis 3-venia, v. lateralibus media infra evanidis.

Interior multo angustior bivenia. Lod. et stam. ut in flos. inferiore.

Flos. exterior spiculæ sessilis: masculus muticus. Palea, exterior hyalina, lanceolata, lata 3-venia, venis fere completis, marginibus hirtis. Interior subchartacea angustior bivenia, striata marginibus hirtis.

Palea exterior flosc. superioris hermaphrodit, hyalina, convoluto-concava, bipartita, sinu aristum longum subulatum basi glabrum cæterum scabrum, siccitat tortilum, palea 4-plo fere longiorem gerente, 3-venia, v. lateralibus cum centrali ad basim aristæ confluentibus.

Interior angusta hyalina, basi latior bivenia emarginata. Lodiculæ et stamin. ut in aliis fere. Antheræ oblongæ, breves, in masculis lineares, duplo majores! Ovarium ovato-oblongum sessile glabrum. Styli 2 distincti, sursum attenuti, stigmata plumosa ratione stylorum longa ($1\frac{1}{2}$ excedentia) ramis simplicibus denticulatis.

Caryopsis paleis inclusa (immatura) oblongo-ovata stylorum basibus terminata, lævis.

Reference to the figures of the paleæ.

a. Outer palea of outer flower of stipitate spicula.
b. Inner ditto and lodicula.
c. Paleæ of inner flower of Ditto.
d. Paleæ of outer flower of sessile spicula.
e. Lodiculi of perfect flower.

AVENA.

1. *Avenæ sp*. Gramen erectum 4-5 pedale, foliis pubescentibus subtus glaucis collo extus intusque barbatis, ligula lacera membranacea.

Panicula nutante ramulis insertione secundis, spiculæ lineari-lanceolatæ convexiusculæ, 3-flora, summo tabescenti. Glumæ lanceolatæ acutato-mucronatæ, inferior duplofere minor. Palea exterior lanceolata, consistentiæ glumæ apice profundiusculi bifido sinu arista subunciali glabra gerenti.

Rachilla præsertim flores subtus vilosa. Palea interior membranacea binervis bicarinat glandulæ Hypogynæ apice ciliatæ. Ovaria pubescens.

In collibus *Moflong : November 5th*, 1835.

Poa.

1. *Poa ciliaris Linn,* Roxb. Fl. Indica 1-335. Kunth Agr. 1-337?

Gramen parvulum gracile elegans 1 pedale. Culmi graciles, vaginæque apicibus longe pilosæ, lineatæ. Fol. linearia latiuscula glabra. Panicula *conica* : 3 composita. *Rami* inferiores divaricati, *ramulique* inferiores, insertione pilosi, axillis nempe callum exquo pili originem ducunt continentibus; hi *pendentes* inferiores locustas 3-4 superiores unam tantum gerunt.

Locustæ ovatæ, lateraliter compressæ sub 8-floræ supra purpureæ, superiores paniculi cujusque primum florescentes. Glumæ inæquales muticæ carinatæ, rubræ; exterior secus carinam totam denticulata interior majorque apicem versus tantum. Palea exterior mutica. 3-nervis, carinata carina denticulata interior bicarinata mutica, secus carinas longe ciliata.

Stam. 2? rudimento tertii?

Pericarp. paleis membranaceis laxe involut. simul cum iis deciduum, ovatum, læve brunneum, embryo paleæ exteriori oppositus et semen latere *huic* opposito magis convexum.

Cum præcedenti : *September* 14*th*, 1835.

Situation and alternation of parts Pl. CXXXIX. Fig. 133.
a. Palea exterior.
b. „ interior bicarinata.

2. *Poa punctata,* Roxb. Fl. Ind. 1. p. 339?

Gramen erectum. Culmis compressis, fol. linear. convolutis. Ligula brevissima. Paniculis thyrsoideis, spiculis 11-18 floris. Locustæ compressæ alternifloræ rachi flexuosæ. Glumæ 2, membranaceæ muticæ inæquales, exterior minor lanceolata 1-nervis, nervis interior ovata sub-carinata carinis scabris. Paleæ 2, membranaceæ muticæ acutæ, exterior ovata carinata major 3-nervis, nervis lateralibus etiam prominulis interior planiuscula binervis; nervis scabris. Stam. 2, paleam interiorem antea sitæ. Anth. purpureæ. Lodiculæ 2.

Styli 2, Stigmata plumosa (ramificationibus paucis.) In humidis cum præcedent: *Septr.* 12*th*, 1835.

Partium situs et alternatio, Pl. CXXXIX. Fig. 117.

a. Palea exterior.

b. ,, interior.

3. *Poa unioloides,* Roxb. Fl. Ind. 1-340. Kunth Agr.? 1-335.

Gramen pedale erectum. Culmis vaginisque glabris lineatis, fol. linearibus supra parce longeque pilosis præcipue basim versus ligulis obsoletis. Panicula subnutante, locustis ovatis 18 floris, rubro-viridibus. Pedicellis filiformibus longiusculis. Pedunculis 1, vel 2, locustiferis.

Glumæ valva exterior minor 3-nervis, diaphana punctulata ambæ muticæ acutæ, carina denticulata 1-nervis rubra. Palea exterior ovata carinata, acuta, carina denticuculata, nervis 2, lateralibus viridibus prominulis, cæterum *hinc* rubra, interior membranacea, apice rarius bifide sæpissime integro obtusiusculo, subbicarinato, carinis scabris. Lodiculæ 2, Stamina 2, paleæ interior opposita, antheris rubris. Styli 2, Stigmata plumosa. Ovarium stipitatum filamentorum basibus stipito adnatis.

Situation and alternation of parts. Pl. CXXXIX. Fig. 128.

a. Palea exterior 3-nervis.

b. ,, interior 2-nervis.

c,c. Stamina.

d,d. Lodiculæ.

e,e. Stigmata.

Secus ripas fluminis infra *Jumalpore Legio*: *September* 14*th*, 1835.

Melica.

1. *Melica latifolia,* Roxb.

Gramen exaltatum, 5-6 pedale; aspectu quadammodo

Bambusæ. Culmis simplicibus farctis, internodiis lævibus elongatis. Vaginis arctis ciliatis, fol. pedalibus vel paullo ultra, ensiformibus, latissimis, diametro nempe intermedium 3 unciale, acuminatis, marginibus lævibus, supra læte virentia subtus glauca, ligula obsoleta et quasi basi truncata.

Panicula amplissima, ramis ramossisimis alternis, basi incrassatis villosisque, nutantibus, vix secundis, ramulis pendulis, filiformibus, spicis plurifloris secundis, et anticis rubro tinctis, brevibus, flosculis spiculis geminatis (in pedi cellis brevibus inæqualibus scabris) secundis. Gluma bivalvis mutica; valva exterior, rotundata, minor 1-venia, vena infra apice evanida.

Interior, superiorque, rotundata brevissime ciliata evena. vena infra apice, evanida.

Floscul 3, cuique spiculæ. Exterior glumaceus neuter, valvula ovata, marginibus subinvolutis concava, mutica; 1 venia.

Intermedius hermaphroditus bivalvis, valvis muticis, exteriori acutata convoluto-ovata 1-venia, dorso et intro-marginaliter pilis longis seriatis hispida.

Interior minuta hyalina, bicarinata, ciliata. Stam. 3. Lodiculæ 2.

Tertius rudimentarius stipitatus, valvula interiore flosculi hermaphoditi opposit. Valvula exterior; glumæ exteriori opposit minutissima.

Ad pedes collum *Naga:* usque ad altitudinem 1000, pedum; vidi. *March 9th,* 1836.

Melica latifolia of Roxburghii? Hujus affinitas certo cum Arundinaceis quibusdam, a Panico vix differt non nisi flosculo tertio rudimentario, charactere tamen magni momenti. Examinavi tantum longe ante perfectionem genitalium.

Char. gener. Locustæ 3 floræ. Glumæ rotundatæ muticæ, exteriori minori, flosculus infimus 1-valvis, neuter valvula glumaca. Intermedius bivalvis, hermaphrodit, valvula exteriore intro-marginaliter pilosa. Interiore bicarinata. Stam. 3. Lodiculæ 2.

Tertius rudimentarius stipitatus.

Roxburgh supposed that the Chinese use the leaves of his Melica latifolia in packing sugar-candy, Brown says, they are Bamboo leaves: which is at once pointed out by the structure of their bases, a structure so far as I know peculiar to Bamboos.

Situation and alternation of parts. Pl. CXXXIX. Fig. 423. Stomata exist or both cutes.

a. Gluma externa.

b. ,, interna.

c. Flosculus exterior neuter 1 valvis.

d. Valvula exterior floris hermaphrodit.

e. ,, interior.

f. Stipes flosculi tertii tabescentis.

g. Ejus valvula exterior.

Kunth following Trinius has referred Roxburgh's *Melica latifolia* to Panicum; see *P. acariferum.* Agros. p. 125. The glumes are wrongly described and no mention is made of the rudiment of the third floret: for Melica see App. Flinders' voyage.

Centotheca.

1. *Centotheca lappacea,* Kunth Agr. 1-366. *Melica refracta,* Roxb. Fl. Ind. 1-329.

Gramen basi decumbens, 1½-3 pedale, culmis compressiusculis. Vaginis laxis, margine alterno-ciliatis apice marginibus ambobus, fol. lanceolat, undulata, acuminata supra pubescentia bases versus angustata ibidemque ciliata. Ligula lacera breviuscula. Panicula divaricata, semi-nutans, spiculis infimis geminis seliquis solitariis clavatis compressis, subsecundis. Glumæ muticæ, inæquales lanceolatæ acutæ, subcarinatæ secus carinam scabrellæ marginibus membranaceis, cæterum viridibus: (Pedicelli hispidi spiculis basi barbatulis)

inferior exterior 3-nervis, interior 5-nervis, duplo fere minor spiculæ abortione bifloræ, rudimento tertii stipiliformi, apice clavato. Flosculi difformes inferior lævis. Palea exterior breviter mucronata, navicularis, 7-nervia, obsolete emarginata. Inferior planiuscula minor, bicarinata binervis secus nervos scabrella.

Flosculi superioris palea, lateraliter hispida pilis deflexis ebulba oblique, basi valde bulbosis, cellulosam exsertis, emarginatione magis evidente.

Caryopsis utriusque obovato conica, styli base apiculat. Stamina, lodiculæ nondum visæ.

Nigrigam versus in sylvis occurit. Legi etiam apud *Nunklow: January* 21*st*, 1835. *It. Ass.* 321.

Bambusa.

1. *Bambusa monogynia*, Pl. CL. Fig. II.

Spiculæ aggregatæ in fasciculos sessilibus alternantibus, squamis scariosis suffultæ, et interstinctæ, semunciales, plurifloræ in bracteâ glumis simillimâ vacuâ cum spicula secedenta suffultæ. Glumæ, scarioso-membranaceæ, magnæ, naviculares carinatæ, carina sæpe obliquâ, pubescento-ciliatâ, axillis gemmiferis!

Spicellæ glumis 2 carinatis, carinis hispidis, ciliolatis, axillis gemmiferis. Paleæ convolutæ coronam, series aliquas imbricatione formentes, inferiores vacuæ, superiores hermaphroditæ. Ovarium stylusque glaberum. Stigma lineari-lanceolat. glabrum.

Paleæ exteriores 1-2, infimæ, vacuæ, latissimæ sunt expansæ suborbiculares, convolutæ, concavissimæ, Scarioso-membranaceæ, æquiveniæ, venoso-striatæ, interdum emarginatæ, marginibus ciliato-pubescentibus.

Interior flosc. perfectorum tantum aliquoties angustior, paullo brevior consistentia eadem, ciliata, dorso hirsuta bicarinata, 5-venia, vel 8-venia, lateralibus adjectis et duabus præ-

sentibus carinas inter, vena centrale minori, lateralibus cum carinis apicem paleæ versus confluentibus.

Lodiculæ nullæ!

Stamina 6. Filamenta longiuscula, dilatato-plana. Antheræ oblongæ, connectivo in apiculo conico-subulato breviter piloso producto. Pollen globosum sub æquale.

Ovarium ovato-conicum hispidum. Stylus longissimus trifidus, e 2 connatis, testibus fasciculorum vasorum duobus. Stigma planum unicum, lateralibus plumosa, ramis divisis, arjute denticulatis.

A Bambusaceis aliis differ. videtur (Schizostachyo excepto), squamularum absentiâ et stigmato indiviso. *It. Ass.* 10.

Schizostachium.

1. *Schizostachium*, Pl. CLI.

Spiculæ numerosissimæ in glomeratum terminalem, subglobosum, subsessilem, folio terminali bracteisque scariosis, pluribus, 3-5, basi dilatatis, longe aristatis, suffultum dispositæ, sæpius ternatem aggregatæ, et quasi compositæ; basi paleis carinatis, carinis hirsutis, scariosis, acutatis, vel varia aristatis, distichis glumacei dispositis obsitæ, lateralibus plurifloris 3-5? ob evolutionem scrotinam compressiusculis terminali biflora, precocione teretuiscula, (lineæ septem sæpius longæ.) Flosculus penultimus tantum evolutus, ultimus stipiliformis tabescens, inferiorus uni-paleaceus.

Glumæ 2 paleis suffultientibus omnino similes scariosæ chartaceæ compressæ, carinatæ, carina hirta, spica terminalis glabrata, venoso-striatæ in aristam subulatam hirtam longitudine variam sursum attenuatæ.

Paleæ glumis simillimæ, magis membranaceæ et minus carinatæ, carinâ glabratâ longius aristatæ, basi rachillam amplectentes, 1-2 summæ et præsertim floris evolute circumvolutæ, axillis inferiori sæpe spiculas additorias incomplete evolutas ob immaturitat. longissime aristatus, proferentibus! (spicula centrali tantum his experte,) cæterum vacuis.

Paleæ floris evolute in subulam circumvolutæ, consistentia magis membranaceæ, ut aliis venoso-striatæ, venis sæpe transverse-anastomosantibus; exteriore, arista brevi obliquiscula apiculata; interiori, huic conformi et convenosa muticâ dorso centraliter profunde sulcata, sulca intus prominula et carinam quasi inverse sitam formante, basi dorsaliter rudimento. Stipiliforme minuta, flosculi ultimi quasi appendiculati. Lodiculæ tres, postica tertiave paullo minore an semper medio intus carinato-plicata, paleæ interiori opposita, lateralea paleis alternantia sed paleæ interior. omnino obvolutæ oblongæ lanceolatæve, maximæ petaloideæ apice rotundatæ et breviter ciliatæ integræ medium supra 3-5-venosæ! venis evanidis infra apicem.

Stam. 6, tria lodiculis opposita, tria cum his alternantia, juniora tantum visa. Filam brevissime. Antheræ lineares lodiculas paullo suprantes.

Ovarium conicum glabum. Stylo longissimo clavato, sursum hirto terminat. fasc. vas. 2 lateralibus præcurso. Stigmata 2, terminalia plumosa, ramosa, ratione styli brevissima.

Caryopsim non visi.

Bambusaceæ (*Schizostachium*), Pl. CLI.

Spiculæ glomerato-spicatæ, teretiusculæ, compositæ; laterales pluri, terminales bifloræ. Glumæ 2, compresso-carinatæ acutatæ vel aristatæ. Flosculi inferiores unipaleacei, paleis glumis similibus, summis circumvolutis; penultimus evolutus; summus stipiliformis tabescens. Paleæ, fl. hermaphr. circumvolutæ exteriori breviter aristata, interiore mutica. Stam. 6, Lodiculæ 3, maximæ petaloideæ breviter ciliatæ integræ.

Ovar. glabrum, stylus longissimus clavatus hirtus. Stigmata 2, terminalia plumosa.

Gram. fruticos., inerme ramis laxis, habitu Bambusæ. Ligulæ. Glomeruli terminales subsissiles, folio suffulte, bracteisque scariosis pluribus basi dilatatis aristatis? spiculæ,

paleis glumis similibus suffultæ, in glomerulas depositas congestæ, globmerulis bracteis interstinctis.

Ex charactere videtur proximum *Schizostachyo* Nees, forsan inter hoc et Nastum ambigua, differt tantum flos. sumo stipiliformi lodicular. præsentæ stigmatibusque binis, a posteriori glumis paleis similibus, stigmatum numero binario et habitu *N. capitatus* Kunth, forsan mei generis congener.

I have described this as glumaceous; which indeed it may aborigine be; The spiculæ are originally simple, becoming compound only by the axils of the paleæ bearing additional ones. It is not difficult to conceive that the normal form is, to have one terminal spicule; which by the continued development of lateral flower buds, assumes the subsequent anomalous structure and appearence. Nees describes Schizostachyum as glumaceous, his description in this respect tallies well with the present plant; but I cannot form an opinion as to the correctness of his opinion without a more extensive acquaintance with Bambusaceous grasses than I posses at present.

Triticum.

1. *Triticum*, Pl. CL. Fig. III.

Erectum. Culmi simplices 1½-2 pedales intermedii brunneo-striati. Articuli minuti pubescentes tumidi, vaginæ laxiusculæ his paullo breviores glabræ, fol. linearia angusta valde acuminata tenera, marginibus minute denticulatis, collis utrinque ciliatis, ligula lacera.

Spica terminalis abbreviata. Rachis flexuosa articulata, compressa, articulis ciliatis et ad basim locustarii. breviter hispidis. Locustæ alternantes sessiles infima tabescens, reliquæ, trifloræ, flore summo tabescente.

Glumæ membranaceæ, muticæ marginibus hyalinis, oblique carinatæ basi distantes subæquales hinc et facie exteriori bivenia, venula interjecta illinc facie interiori 1-venia, carina scabra.

Paleæ 2, exterior navicularis apice longe aristata, consistentia glumarii, 9-venia, v. 5 completis, 4 interjectis incompletis. Interior minor, bicarinata, carinis scabris exceptis hyalina.

Lodiculæ 2, oblongæ hinc rotundatæ, ciliatæ, bases versus carnosæ, Stamina 3.

Ovarium sub-globosum, hispidum. Styli 2, basi fere stigmatosa. Stigmata plumosa, ramis simplicibus conspicua dentatis.

Rudim. 1-paleaceum.

Ad ripas. *Brahmaputra*: verisimilliter cultæ.

In the obliquity of the glumes this has some affinity with Alopecurus. Kunth describes the stigmata as sessile; but this is merely owing to the coalescence of the styles into a thick white hairy cellular mass. This is seen most distinctly in Hordeum. The alternation and exterior situation of the lodiculæ is well seen in this genus. *It. Ass.* 453.

HEMARTHRIA.

1. *Hemarthria compressa*, Br. Pr. 1. (63) 207 Kunth Agr. 1-465. *Rottboellia compressa* Roxb. Fl. Ind. 1-354.

Spicæ compressæ; rachi ½ articulata, 2-3. ex axillis foliorum, pedunculatæ: pedunculo basi paleo suffulto? medio articulato ibidemque bracteam vaginantem membranaceam gerentes. Flores geminati in excavationibus racheous; alter exterior stipitatus, stipite complanato secus latus interius rachi adnato, excavationem in quam flos interior sessilis nidulate ex dimidia parte perficiens: Gluma floris utriusque biflora, bivalvis, interior floris sesilis chartacea, extus plana multinervis, mutica, apice membranaceo emarginato.

Interior mutica membranacea 1-nervis, *racheos excavatione* adnata, et vix sine laceratione separabilis apice tantum libero et etiam lateri stipitis adnati. Flos exterior neuter 1-paleaceus; marginibus recurvis quoad axes, rachis, membranacea mutica; binervis.

Flos interior hermaphrodit. Paleæ 2, interior quoad axes racheos exterior quoad axes floris vel perianthii, oblonga mutica enervis, exterior nana enervis. Lodiculæ 2, latæ truncatæ. Stamina 3. Styli 2. Stigmata totidem plumosa. Floris exterioris pedicellata, gluma bivalvis biflora, quam in sessili magis acuminata, exterior extrorsum plana pluri-nervis apice subobliquo attenuato, bifido, interior carinata 3-nervis, aristato-mucronata.

Paleæ, lodiculæ, stam. etc. ut in flore sessile.

Gramen basi decumbens: vaginis brevibus glabris ligulis laceris obsoletis foliis linearibus erectis subglabris, vaginis duplo longioribus.

In graminosis humidis inter *Pubna* et *Sheerazgunge: September* 12*th*, 1835.

The above view relating to the union of the stipitate flower, I adopted before reading the generic description in Kunth's work. It is borne out by an analogy of the neighbouring genera: by the pedicel being in some measure separable, and by the inner glume of the inner flower adhering only to the true rachis. The rachis is hence rather oblique, or rather the side of the excavation opposite to the pedicel of the stalked flower, is rather larger. Mr. Brown perhaps refers to the same idea, otherwise he could scarcely say, "Gluma superioris soluta".

Partium situs et alternatio (floris exterioris.) Fig. 109.

a. Gluma exterior.

b. Do. interior.

c. Palea interior floris exterioris neutrius.

d. Palea exterior floris hermaphrod.

e. ,, interior nana.

The view of the flower being stipitate is proved by the lowermost articulation only having one.

2. *Hemarthria*, Pl. CLVI. Fig. 1.

Læve. Culmi basi decumbentes, geniculati vaginæ interno-

diis glabris breviores, ciliatæ. Ligula fimbriatem laceræ, fol. glabra, linearia acuta, marginibus denticulatis. Spiculæ terminales paullo compressæ, apice subulatæ spithamææ. Pedunculus brevis inarticulatis, basi palea 1 longa stipatus. Glumæ transversæ exterioris dorso planiusculæ, membranaceo-coriaceæ, apices sub-emarginatæ acuminatæ sub 7-veniæ, vena centrale incompleta; reliquis utrinque apice conniventibus. Interiores naviculares, carinatæ magis membranaceæ, præsertim floris sessilis quæ hyalina et acuminato-aristata, stipitato, carina magis evidens scabrella, viridis, in aristam glumam æquante vel superante dentatam product. Paleæ hyalinæ muticæ floris neutrius lineari-oblonga marginibus volutis, basi incomplete bivenia.

Palea exterior floris interioris, latior, cæterum, huic conformis. Interior ovato-lanceolata nana, ambæ eveniæ. Stam. 3. Lodiculæ 2, cuneatæ dentatæ. Stigmata plumosa, ramis obsoleto-denticulata. *It. Ass.* 452.

In arenosis *Brahmaputra*: *March* 27*th*, 1836.

An differt ab H. compressâ, certe si pedunculus inarticulat.

Rottbœllia.

1. *Rottbœllia.* Gramen procerum, 8-12 pedali vaginis rubro-tinctis internodiis lutescentibus interdum luteis, fol. inferiore 3 pedalia subtus carinata, nervo medio supra niveo albo diametro transversat. 2 unciale margine scabro. Paniculis axillaribus terminalibus nutante pendulis, secundis, vaginis limbo abbreviato spathiformibus, ad intermediis suffult. Pedicellis filiformibus elongatis medio articulatis, ibidemque vagine arctiuscula circumvolutis. Spicis purpureo-tinctis, flosculis muticis. *It. Ass.* 272.

Inter *Nunklow et Nowgong*, prope *Nowgong*: copiose occurrit. *November*, 1835.

VOSSIA.

1. *Ischæmum* (*Vossia Gr.*) *cuspidatum*, Roxb. Pl. CLIII. Figs. I. II. Fl. Ind. 1, 325. Kunth. Agr. 1-516. *Vossia procera* Gr. Mss. Wall. et Griff. Journ. As. Soc. Vol. V. 1836. p. 572.

Spicæ binæ vel ternæ rarius 4 digitatæ ; maximæ 6-8 unciales. Rachis articulata flexuosa (flexuris retrorsis sinis trorsisque) extrorsum convexiuscula, introrsum planiuscula ; marginibus *acutis* scabris rotundatis glabris, excavata, articuli biflori : flore altero sessile altero interiori pedicellato, pedicellis articulos paullo superantibus ; gluma biflora bivalvis dissimilis ; exterior chartacea, dorso plana nervosa, apice *marginibus involutis* ortum cuspidem longum glumam 1 ½ superant planam subundulatam marginibus denticulatis scabris gerent.

Interior membranacea breve mucronata navicularis dorso medium supra gibboso carinata, 3-nervis : nervo medio medium supra tantum distincta, interstitio venuloso.

Perianth. exterius masculum bipaleaceum. Paleæ membranaceæ complanatæ, marginibus *mutuo* involutis subciliatis, binerves, exteriore apiculo brevi pubescente ; glandulæ hypogynæ 2, maximæ, basi cuneatæ, supra latissimæ, quasi excavatæ sulcatæve, *margine utroque dantato*, dentibus anticis posticis que confluentibus singulis, his majoribus. Stam. 3.

Perianthium interius hermaphroditum. Paleæ ut in mare sed exterior (interior quoad axin) 3-nervis. Lodiculæ Staminque ut in mare. Ovarium abovatum. Styli 2. Stigmata plumosa ratione Styli longissima, denticulata.

Gramen in aquis stagnantibus leniterve fluentibus profundis proveniens, fluitans glaucescens ; culmis immersis crassis cellulosis, radiculas capillaceas ad geniculos emittantibus, emersis foliorum vaginis laxis, compressiusculis tactu scabris undique tectis. Vaginarum axillis proliferis vel potius gemmiferis collis densissime barbatis, ligula brevi-truncata dense ciliata, foliis lineari ensiformibus basi subcordatis 2-2 ½ pedalibus longissime subulato-acuminatis inferne gla-

bris superne parce pubescent: nervo centrali crasso, *albo*, supra plano infra prominulo, marginibus cartilagineis antrorsum denticulatis. Spicæ terminales digitatæ 2, laterales brevissime pedunculatæ peduncalo basi cartilagineæ villosiusculo intermedio longiuscule, angustiore, basi glabra, patentes, subnutantes florisbus sessilibus *extrorsum* dispositis; spitatis quorum infimis sæpe abortivis introrsum rachi introrsum planiuscula, extrorsum corvexiuscula.

In aquis "*Jheels*" dictis prope *Hubbegunge*: fluminis *Barak*.

Pollen rotundatum inæquale.

Flosculi infimi summique stipitati tabescentes; sæpius masculi, interdum rarius ?. Perianthium interius hermaphroditum.

Char: Generis, (Confer Clariss. Br: Ratzeburgi.) Spica articulata, rachi flexiosa, excavata. Locustæ in singulo articulo duæ; altero exteriore sessili; altero interiore pedicellato, 2 floræ; glumæ valvæ 2, dissimiles: exterior chartaceo-cartilaginea plana; apice in cuspidem planum longum producta, interior membranacea mutica navicularis, carinata. Flosculi hyalini mutici; superior hermaphroditus (in locusta stipitata sæpius masculos) 3-nervis! Lodiculæ 2: basi cuneatæ dentatæ dentibus biseriatis.

Stamina 3. Ovarium glabrum. Styli 2, basi distantes. Stigmata coarctato-plumosa. Flosculus inferior masculus, bivalvi binervis marginibus inflexis.

Gramen procerum gigantium fluitans. Culme 3-4 stachyi. Folia longissime-acuminatissima, supra pubescentia; nervo centrale crasso albo vaginâ laxâ compressiusculâ, ligula indivisa densissime ciliata.

Obs. Hemarthriæ accedit discrepans, stipitibus glumisque interioribus, florum sessilium solutis, flosculisque exterioribus bipaleaceis masculis nec neutris. Habitu Tripsaci.

Dimeria.

1. *Dimeria diandra*, Gr. Pl. CLVII. Fig. II.

Spicæ binæ, lineares, filiformes. Rachis inarticulata flexu-

osa ad situs spicularum subexcavata dorso? plana, scabrella. Spiculæ breviter stipitatæ, (stipitibus planis dilatatis apice, subcyathiformibus, rachi adpressis, marginibus minute scabrellis), bifloræ, lineares, angustissimæ, inter spatiam, inter spiculas æquantes, basi breviter barbatæ. Glumæ, 2, muticæ carinatæ chartaceæ 1-veniæ, carina scabra, exterior inferior subduplo minor, hirta, interdum ciliata interior sæpius carina excepta glabrata. Flosculus exterior univalvis neuter, palea minuta, hyalina, subconvoluta, sub 3 dentata.

Flos superior hermaphroditus, Palea exterior lanceolata, hyalina, concavo-carinata, apice emarginata, sinu aristam, tortilem medium versus extrorsum geniculatam paleam aliquoties excedentem madore rectam ima basi excepta scabram gerente.

Interior minutissima, vix hyalina; subcarinosa, lanceolata apice in pilo longo-apiculata! cellulis clavatis ciliata. Lodiculæ 2, cuneatæ, apice rotundatæ subintegræ, in sinu paleæ exterioris.

Stam. 2 semper; hoc cum lodiculis alternante, ideoque paleæ exteriori opposit semper majus altero laterale, aliquando abortient. Filamenta breviuscula, antheræ oblongæ breves. Ovarium oblique ovatum, styli 2, basi distincti, stigmata plumosa, ramis simplicibus denticulatis, ratione stylorum longiuscula, (½ longiora). Caryopsis subcylindracea hinc oblique apice attenuata stylorumque basibus terminat. brevissime stipitata.

Gramen parvulum spithamæum annuum habitu Andropogonis culmis ramosis, internodiis hirtis. Folia pilosa lineari-lanceolata acuminata, vaginis pilosis, laxis, collis imberbibus ligulis rotundatis denticulato-ciliatis. Spicis longe pedunculatis, folio summo cujus lamina brevissima, vaginaque longissima suffultis, fuscescentibus.

D. diandra nob. floribus linearibus, barba baseos brevi, arista paleæ exterioris; fl. hermaphrod. medium infra scabra, staminibus binis.

Ob. differt ab omnibus aliis Sacharoideis mihi cognitis gluma exterior carinata.

Saccharum.

1. *Saccharum spontaneum.*

Inflorescentia paniculata; ramis paniculæ subverticillatis. Spiculæ biflorae; flore infimo subsessili, altero longiuscule pedicellato, uterque hermaphrodit. Inferioris bivalvis, valvis acutis subæqualibus, altera superior interior dorso carina convexiuscula, altera inferior planiuscula, binervis. Palea *binervis* lanceolata ciliata.

Stamina 3. Lodiculæ 3, late cuneatæ, (stigmata pennicillata) unâ paleæ binerviæ oppositâ reliquis latiore.

Glumæ floris pedicillat; magis acuminatæ, interior ciliata. Palea oblonga ciliata in sinu exterioris adest (exterior) altera linearis angustissima, tertior nana lata apice ciliata, paleæ majori opposit. forsan pro lodicula ampliata habenda.

Alternation and situation of parts, Pl. CXXXIX. Fig. 63.

a. Gluma interior (exterior.)

b. „ exterior, binervis!

c. Palea unica floris exterioris neutrius.

d. Palea exterior angustissima, floris hermaphrodit.

e. „ interior brevissime.

f, f. Lodiculæ.

g, g, g. Stamina.

Infra medium chartacea, supra membranacea. Gluma bivalvis subæqualis, mutica, exterior binervis, basin versus bigibbosa: interior 1-nervis carinata, *biflora.* Flos exterior neuter 1 paleaceus. Palea oblonga enervis ciliata membranacea. Interior hermaph. Paleæ 2 inæquales enerves membranaceæ, exterior linearis angustissima, subciliata, interior nana denticulato-ciliata. Lodiculæ 2.

2. *Saccharum panicosum* Gr. *Panicum.* Lam. *Pogonatherum crinitum* Trin.—Kunth Agr. 478.

Gramen culmis fasciculatis, gracillimis pedalibus; articulis hispidis vaginarum foliæ æquantium collo ciliato, fol. linearia basi lanceolata, tenera margine scabrella, spicæ longe

pedum subulatæ, (pedunculis purpurascentibus subspicam sæpius an semper? articulatis) dense villosæ fusco-aureæ.

Flores secundi, geminati, altero sessile, altero pedicellato, utroque basis sed præsertim infero pilis longis densis barbato.

Glumæ membranaceæ subæquales, exteriore mutice ovato apice longissime ciliato, 2-nervis, interior carinata; carina scabra arista fusco-nitente denticulatâ longissimâ, apice breve ciliata. Paleæ membranaceæ, bifidæ; exterior bifida, 1-nervis carinata aristâ simili longissimâ interior mutica latior semi-obvolvens, enervis, marginibus versus apicem brevessime denticulatis styli 2 ima basi coalita. Stigmata plumosa rami simplices. Lodiculæ O. Stamen ratione styli longiss. unicum, paleæ exterior opposit.

Flos. stipitatus fæmineus similis an semper sed minor. In muris humidis infra *Osunpoor : September 27th,* 1835.

Confer Br. Pr. 1 204 (60) sub Imperata; ob partium situm, valvula latior glumæ exteriori opposita est, palea univalvis floris nutrius, Pl. CXXXIX. Fig. 211.

a. Outer gluma.
b. Inner aristate do.
c. Outer aristate palea of hermaphrodite.
d. Inner palea of outer neuter flower.
e. Stamina.

3. *Saccharum procerum,* Roxb. Fl. Ind: 1-248.

Gramen procerum in aquis stagnantibus (*Jheels*) proveniens; culmis emersis. 8-10 pedalibus solidis, vaginis glabris arctis vestitis, fol. linearia longissime 2-3 pedalia, plana, apice longissimo subulato, nervo magno centrale infra carinato albo, marginibus cartilagineis denticulatis antrorsum. Ligula barbata culmorum apices et partes in paniculæ formationem ineuntes lanato sericei villis albis.

Ramulis subverticillatis dense nutante patentibus flosculis basi longe barbatis (barba nivea). Glumæ æquales membra-

naceæ basi vix cartilagineæ acutæ, apices versus ciliatæ, exterior, binervis, interior (vel inferior) 1-nervis subcarinata valde ciliata. Paleà exterior (superior) lanceolata ciliata.

Lodiculæ glumæ interiori (inferiori) oppositæ cuneatæ, (margine supero lunulato) ciliatæ Stam. 3. Styli 2. Stigmata plumosa ratione styli brevia.

Palea minutissima apice laciniato-ciliate, sinu paleæ glumæ exteriori (superiore) opposita ambæ enerves.

Palea angustissima, filiformi, apice submembranacea, subdilatata ciliata, glumæ interiori opposit lodiculisque alternans.

In aquis *Jheels* dictis ad pedes collium *Khasyah: October 7th,* 1835. *It. Ass.* 7.

Paleæ utriusque floris 3, nec 2 flore stipitato ut ant. Roxburghius.

4. *Saccharum.*

Gramen elatu in arenosis cæspitosum virens, 5-8 pedale, fol. linearibus, longissime subulato-acuminatis (siccis convolutis) marginibus scabris, denticulatis, nervo medio albo. Panicula tenuis subpatens axi sericeo albo villoso. Ramis subverticillatis, floribus distantibus lana sericea, longe dense obsitus, floribus 3-plo longioribus.

Gluma exterior planiuscula dorso, quasi bi-carinato, paulo longior.

Interior, carinata, ambæ basi coriaceæ vix cartilagineæ, apices versus ciliatæ obtusæ.

Palea exterior, floris hermaphrodit interioris huic opposita, angustissima, inclusa interior emarginata bifida, ovaria semi-involvens inter glandulus cuneatus ciliatus sita. Exterior floris exterioris neutrius, unica lanceolata hyalina ciliata.

Stam. 3, Styli 2, ima basi coalita. Stigmata plumosa ratione styli æqualia.

Stipes floris superioris, inferioris, florem æquans.

Bogapanee in arenosis prope *Umjilly: November 7th,* 1835. *It. Ass.* 216.

5. *Saccharum.*

Gramen elatum 3-5 pedali, vaginis adpressum sericeo-pilosis, fol. linearia, acuminatissime subulata, siccitate convoluta, glauca nervo medio albo, marginibus glabriusculis, collis barbato-lanatis ligulis laceris ; culmorum apicis lana adpressa albo-canei. Panicula erecta coarctata, ramulis alternate dispositis, divisionibus ultimi subsecundis, floris approximate, pilis sericeis rubris pulchre nitentibus subrigidis obsitis rachillis eodem more sericeis, pili flores longe superantes 3-4 plo. Glumæ basi cartilaginiæ fuscescentes, exterior paulula brevior dorso planiuscula, apice emarginata, interior convexa, ambæ acutatæ apicibus membranaceis, pubescentes.

Palea, floris exterioris neutrius lineari lanceolata, acuminata, medium versus pallide carnea.

Glandulæ hypogynæ 2, cuneatæ apice denticulatæ. Interior floris superioris hermaphrodito, lanceolato-acuta ciliata longitudine ovarii eoque arcte applicit.

Exterior hujus in sinu glumæ interioris aristæformis, longissime exserta, glumas 4-plo-5-plo excedens, antrorsum denticulata! Styli 2, Stigmata plumosa ratione styli longiuscula. Stam. 3.

Moflong : inter colles, *November 7th,* 1835. *It. Ass.* 217.

6. *Saccharum.* Altiulidine 5-7 pedale, vaginis inferiorib. hispidissimis superioribus glabratis, foliis collis barbatis, ligula membranacea brunea lacera, foliis angustissimis inferne attenuatis ; ideoque quasi canaliculatis 3-pedalibus acuminatissimis in subulis, margine denticulatis. Panicula sericea ramis ascendentibus barba, nivea sericea nitida, tenuissima. Ramis panici subverticillatis.

In collibus *Nunklow : November 16th,* 1835. *It. Ass.* 260.

7. *Saccharum Sect. Erianthus.*

Gramen elatum 4-8 pedale, internodiis elongatis nodisque glabris, ligulis brevibus, fol. linearibus angustissimis, basim ver-

sus *quasi in petiolo* attenuatis acuminatissime 1½-2 pedalibus, scabris, spicis semi-verticillatis vel solitariis in paniculam terminalem erectam ascendentem dispositis, floribus germinatis. altero pedicellato citius labente exteriori altero sessile, flos, sessilis glaber: stipitatus longe sericeo-pilosus; rachi, stipitibusque eodem more pilis donatis.

Glumæ membranaceæ, muticæ acutæ brunneæ; exterior, dorso planiuscula apice versus breve ciliata, bivenia! interior carinata longius ciliata, nervo centrali obsoleto.

Perianth. 2, exterius glumæ carinatæ opposit. 1 palearum neutrum, palea lanceolato-membranacea apicem versus hyalina ibidem ciliata cæterum brunnescens, enervis. Per. interius hermaphrod. bi-paleaceum, palea exterior inferiorque hyalina, nana, palea floris neutrius 3-plo-brevior, breve ciliata apice bidentata, sinu aristam palea 6-plo longiorem basin versus glabram tortilemque cæterum denticulat. rectamque gerente. Interior *nanissima* membranacea hyalina, enervis, secus marginem denticulat semen arcte involvens. Lodiculæ 2 cuneatæ.

Embryo paleæ aristatæ opposit.

Caryopsis, stylorum basi unilorum reliquis apiculat. Floris stipitata pars omnino ut in sessili sed glumæ et præsertim exterior pilis longis rectis apecibus exceptis obsitæ. Lodiculæ an connatæ?

In campis graminosis *Suddyah*: Copiosa *January 2nd*, 1836. *It. Ass.* 289.

Congener numeri 287, qui certe non Ischæmum medium forsan inter Saccharum et Andropogon.

8. *Saccharum.*

Gramen elatum speciosissimum 6-15 pedal. Vaginis foliisque bases versus densessime barbatis; foliis margine scaberrimis.

Panicula ampla, laxiuscula, demmum subcoarctata, 1-1½ pedalis, pulcherrima et quam maxime conspicua ob nitorem coloremque rosaceum.

Occurrit in collibus: intra *Myrung* et *Nunklow*: copiosa

præsertim inter rupes granitiens. *November* 14*th*, 1835. *It. Ass.* 250.

9. *Saccharum, Sect. Erianthus.*

Pubescens laxus: semi-scandens pilos-strigosa vaginis internodiis superantibus, ligula truncata dorso pubescente, nodis pilosis, folia lineari-lonceolata acuminatissime margine denticulato, spicæ filiformes binatæ, 3 natæ, vel solitariæ insertionibus albo pilosis, flosculis geminatis altero exteriorique pedicellato, altero sessile, utroque sed præsertim sessili basi barbato.

Glumæ, membranaceæ, muticæ acutæ hispidæ, exterior dorso plana, apicem versus ciliata, 5-nervis, interior carinata carina apicem versus denteculata marginibus membranaceis ciliatis, 3-nervis.

Palea exterior, parva glumæ interiori opposit membranacea apice bifide, sinu aristam, longissima medium infra lævem tortilem supra rectam scabramque gerenti, 3-nervis, nervis 2 lateral in sinum confluentib. interior oblonga, membranacea: binervis. Lodiculæ 2, cuneatæ. Stam. 3. Styli 2.

Arista aqua immersa parte tortile *solubilis.* Flosculus stipitatus omnino conformis.

In sylvis *Suddyah: January* 2*nd*, 1836. O. No. 289. *It, Ass.* 287.

10. *Saccharum, sect Erianthas.*

Gramen elatum, 5-8 pedale; culmo ramoso farcto.

Folia abasi ad medium oblique ascendentia, tunc pendula ensiformia, 1 ½ unciam latitudine pedalia vel sesqui-pedalia, valde acuminata in apicem subulata, margine cartilagineo antrorsum denticulato, vena primaria apicem versus, subevanida, cæterum promenula albidaque vaginæ arctiusculæ glabræ, ligula rotundata breve ciliata, os vaginæ utrinque barbatum (arranged along each part of the cutis corresponding to

the course of the veins, they are round, 1 seriate bodies bearing a great resemblance to the glands of coniferons tissuæ) ligulis foliororum supremorum extrors an breviter barbatis, foliisque basi utrinque sed-præsertim extus barbatis.

Panicula, spithamæa pedalisve, pilis laxis hinc ellinc hirsuta, ad insertionem spicarum barbata. Spicæ plurimæ inferioris lateraliter aggragatæ, reliquæ subverticillatim infernæ cujusque faciculi sessiles simplicesque reliquis stipitatis, ramosisque rachibus commun. barbatis, pilis rectis griseo-brunneis. Spiculæ geminatæ altera sessili, altera stipitata, utroque basi pilis iisdem ac rachis flosculos paullo excedentibus, dense barbata, 2 floræ.

Gluma exterior lanceolata acuminata, dorso-covexa, convoluta, apice bifida brunnea, 6-venia, venulæ 2 unicæ centrales infra apicem evandiæ, 2 laterales cum 2 intemediis quæ in dentes excurrunt confluentes omnes hinc illinc venulis transversis brevibus junctæ : Gluma secus venas *dentium*, vel intermedia apices versus denticulata ut etiam sinus fissuræ, coriacea.

Gluma interior conformis, paullo brevior minus coriacea, acuminata ciliata præsertim medium supra 5-venia, venis lateralibus cum centrali quæ in aristam brevem excurrit medium paullo supra confluentibus, dorso medium infra pilis (supra dictis) breviter ciliata hispida. Flosculus exterior neuter 1 paleaceus, 1-valvis, valva lineari-lanceolata, pilis brevibus hirta hyalina, rubro-tincta, 1-venia.

Interior hermaphrod. bivalvis hyalinus valvula exterior linearis, obsoleto-carinata, pilis brevibus hirta apice bifida, vena centrale unica in aristam longissimam glumam ipsam aliquoties (sub 5-plo) excedentia a basi ima denticulat.

Stam. 3, bases filamertor brunneæ persistenti tantum vidi.

Lodiculæ 2, cuneatæ demum ? pulchre sanguineæ.

Valvula interior minuta late oblonga, apice ciliata, apicem versus sanguinea tincta.

Caryopsis ovata, basi filamentis 3-persistent cincta ; apice coronata stylorum basibus coalitis brunneis, lævis, alba.

Legi prima in colliculo Theifero. *Gubroo Purbut*: *March 8th*, *It. Ass.* 421.

Demum vidi in collibus *Gubroo* vicinis et in collibus *Naga* dictis usque ad allitudin. 1000 pedum ; qua copiose occurrit.

Intermedium esse videtur inter *Saccharum*, et Andropogonem. cui etiam habitu simile est.

In Andropogone, Ischæmo, Saccharo, ?

Gluma exterior an e 2 formata, venis lateralibus nempe excurrentibus, centrali vera nulla. Certe species *Erianthi* Mich. quod genus monente Brunone a Saccharo non satis distinctum.

Imperatæ.

1. *Saccharum* (*Imperata*) *cylindricum*, Roxb.

Flores hermaphrodito-germinati, in rachi articulati, basi lanâ sericea cincti, altero sessile, altero pedicellato.

Gluma bivalvis subæqulis exterior paulo minor mutica marginibus involuta. Paleæ 3-inclusæ, muticæ, hyalineæ : exterior unvalvis cæteris major neutrum, 2 interiores, hermaphroditæ, exterior latiore apice ciliata interior minuta !

Stam. 2. Lodiculæ O. Stylus 1, ultra medium bipartitus. Stigmata 2, penicillata.

Br. Prod. 1-203, (59.) Perianth : exterius 1 valva, neutrum, interius, hermaphrodit. bivalve valvula interiori latiori.

2. *Imperata.*

Fol. cito convoluto, novis glabris, spica terminalis Alopecuroide basi folio florate convoluto ventricoso obtecte, lana longa sericeo-alba. Panicula composita in spicarum cylindraceam coarctata, flores geminati, basi lana longissima sericea involuta alter sessilis, alter inferior exteriorque stipitat.

Glumæ membranaceæ acuminatæ muticæ, convexiusculæ, interior superior *basi lanata* 1-venia, ciliata, exterior conformis, *conlanata* 5-venia. Flosculi 2, exterior neuter 1 paleaceus,

palea hyalina denticulata oblonga subcarinata, glumæ interiori opposit. Interior hermaphrodit bi-paleaceus, palea exterior lata oblonga palea floris neutrius duplo major apice ciliata, evenia interior brevior latissima quasi truncato-genitalia circumvolvens secus marginem superum ciliata.

Lodiculæ O. Stam. 2 (Antheræ fuscæ maculis purpureis,) paleæ interiori opposit.

Styli 2, connati, primo aspectu unicus videtur: basibus tantum vere *adnat.* Stigmata plumosa ratione stylorum longissima atro-purpurea rami denticulati simplices ramosive. Caryopsim nondum vidi.

Suddyah ad ripas *Brahmaputra*: gramen elatum, *January* 2*nd*, 1836. etiam legi.

Gramen 3, 4 pedale, rigidum; culmo lævi gracile, vaginis ciliatis, collis basibusque foliorum barbato-ciliatis, ligula minute rotundata, imberb. fol. lineari-ensiformia acuta striata marginibus superficieque supera asperis, infra quasi in petiolum 4-5 uncialem teretem angustata. *It. Ass.* 290

POGONATHERUM.

1. *Pogonatherum rufobarbatum*, Gr. Caule ramoso, articulis vaginarumque collis glabris: racheos villis flosculos vix excedentibus, flosculis sessilibus bifloris, flore exteriore bipaleaceo inermi neutro interior superiore: hermaph. palea superiore aristata, flosculo superior 1 flora, flora hermaphrodito monandro.

In aquosis; *Moosmai: October* 18*th*, 1835. *It. Ass.* 159.

2. *Pogonatherum*, Pl. CLV. Fig II.

Spica solitaria, terminalis compressiuscula. Rachis articulata, marginibus, ut etiam marginis pedicellorum, villis longis obsitis, articulatis bifloris spicula altera sessilis biflora, altera pedicellata uniflora (an semper) *aversa*.

Glumæ dissimiles, exterior (inferior) chartacea oblonga,

subbicarinata, intervenio plano; quasi truncata, apice dense ciliata, 3-5-venia: venis infra apicem evanidis, superior major carinata membranacea fere hyalina 1-venia, apice in aristam e basi ima scabra longissima producta, apicem versus breviter ciliata, carina scabra. Spiculæ basi villosæ.

Flores stipitati similes sed minores.

Flosculus exterior spiculæ sessilis interdum dificiens; sæpius bivalvis; valvis hyalinis, convolutis; apice presertim interior ciliatis; exterior lanceolata, basi obsoleta 1-venea, interior evenia.

Flosc. interior hermaphrodit: bivalvis. Palea exterior subhylina, membrancea, navicularis, apice emarginata, sinu aristam longissimam, scabram basi subglabram, exserente, 1-venia. Interior convoluta, apice ciliata, evenia. Lodiculæ nullæ. Stamina 2 vel 1. Styli 2. Stigmata plumosa, ramis simplicibus, denticulatis; ratione stylorum brevia. Ovarium, oblique ovatum; margine obliquo paleæ exteriori opposito.

Caryopsis paleis involuta, oblique ovata, sessilis, stylorum basibus terminata, spiculæ stipitatæ flosculus huic similis sed minor. Stamina, unico excepto! paleæ exteriori opposita!

Huic generi Brunonius ascribit defect. valvulæ interioris flosculi hermaphrodit, et stamen unicum. Ob analogiam valvulam interiorem si unicam et *magnam*, flosculo altero neutro, pertinere judicarem, sed planta nuper descripta, in quâ semper adest, flosc. exteriore masculo bivalvi sæpe evoluto, hanc assumptionem negat. Quibusdam notis Dimeriæ accedit.

APLUDA.

1. *Apluda geniculatis.*

Locustæ fasciculatæ (3-5): bractea glumiforme breve aristati, externe suffultæ, 3-floræ, flores 2, exteriores pedicellati: quorum 1 abortiens intermedius difformis sessilis in articulatis.

Glumæ bifloræ muticæ, flores intermedii interior navicularis, membranaceus.

Flos hujus exterior masculus, interior hermaphrodit, (in flore fertile stipitato hic ordo quoad axes reversus). Mascul. Paleæ 2 muticæ exterior major genitalia fovens!

Lodiculæ cuneatæ 2, Stamina 3. Hermaph. Paleæ 2 muticæ exterior ventricosa, interior nana oblonga, genitalia fovens. Stam. 3. Stigmata plumosa. Styli 2.

Bractea ovata cartilaginea? breve aristata multivenia. Flos neuter pedicello complanato cartilaginea. Gluma bivalvis minuta, præsertim valva interior, exterior consistentiæ bracteæ. Paleæ O.

Flos alter in pedicello paulo longiore conformi. Gluma bivalvis, biflora mutica consistentia, et venatione bracteæ, exterior lanceolata angustior acuminata interior latior obtusiorque. Flos exterior masculus interior hermaphrodit. Paleæ floris masculi 2, exterior ovata, concava, genitalia involvens 3-nervis, breviter mucronata, interior minor breviorque subplana *binervis* marginibus inflexis, *distans*. Lodiculæ 2, cuneatæ. Stam. 3.

(Floris intermedii sessilis. Gluma exterior reliquis conformis sed brevior, mutica. Interior difformis, membranaceæ, ventricoso-navicularis, apice plano-cartilagineo venoso. Paleæ etc. floris superioris pedicellato.)

Floris hermaphrodit. paleæ 2, membranaceæ, exterior multo major, subnavicularis, 3-nervis, submucronata, interior mutica nana oblonga, apice denticulata, evenia, genitalia fovens. Filam. 3. Lodiculæ 2. Styli 2. Stigmata plumosa.

Gramen altum, internodiis ex maxima part nudis, vaginis nempe brevibus glabris. Ligula multifida, fol. linearia acuminata, scabra, fasciculis florum paniculatis foliaceis.

Inter Pubna et *Shirazgunge*: in humidis frequens, *September* 11*th*, 1835.

Monente Brownio (Pr. 1-197 (53) sub Xerochloa character hujus generis emendandus, Character Kunthii Agrostog 1-

516, meæ plantæ nullo modo accedit, et genus totum in libro suo pessime elaboratum est. Roxburghii character genericus pro tempore optimus.

A. geniculata, Roxb. bracteis breve aristatis, paleis muticis. Partium situs et alternatio. Pl. CXXXIX. Fig. 106.

a. Bractea involucrans.
b. Gluma exterior.
c. ,, interior.
d. Palea exterior floris masculi.
c. ,, interior plana.
f. Palea exterior floris hermaph.
g. Ejus palea interior.

ANDROPOGON.

1. *Andropogon muricatus*. Pl. CLV. Fig. 1. Retz. inRoxb. Fl. Ind. ed Carey. 1. 269—Kunth Agr. 505.

Inflorescentia paniculatim spicata, spicis verticillatis. Flores 2, ad articulum quemque rachis siti alternatim oppositi, alter exterior et inferior stipitatus masculus, alter interior sessilis hermaphroditus, uterque bi-glumis. Glumæ, coriaceæ, induratæ exterior cujusque floris seriebus pluribus 3-4 muricarum armata interior 1 serie, nempe secus nervum medium lanceolata subæquales exterior dorso convexa, alteram involvens, interior carinata. Utraque basi imberbis. Mas. Palea exterior gluma valvâ exteriori contenta marginibus ciliatis, interior valva interiori content. marginibus, fere simplicibus, *nervo medio centrali*. Lodiculæ 2 cuneiformes magnæ truncatæ, margine supero crenulato, glumæ alternantes interdum in 1 coalitæ? Stamina 3, Rud. ovarii O.

Hermaph. Glumæ ut in mare: ut etiam paleæ, Palea accessoria enervis oblonga, paleæ exteriori! binervi opposit. Lodiculæ staminei ut in mare. Styli 2, breves. Stigmata penicillata.

It must be examined again, I have clearly ascertained that the outer palea should be the inner, and vice versa.

Partium situs et alternatio. Pl. CXXXIX. Fig. 57.

a. Outer larger glume.

b. Inner do.

c. Outer larger 2-nerved palea.

d. Inner 1-nerved do.

e. Third palea opposite the 2-nerved one.

f. Lodiculæ.

g. Stamina.

This plant must still be retained in Andropogon I would limit Holcus to such as have panicled inflorescence, the spiculæ being reduced to the terminal ones. It differs from Andropogon however as Mr. Brown long ago pointed out sub Holco, Pr. Fl. Nov. Holl. 55 Ed Nees, in the awnless flowers; Mr. Brown likewise says that the Perianths are bivalved from the abortion of the inner valve of the upper, or hermaphrodite flower ?. But I have invariably found in both spiculæ an outer neuter flower consisting of a two veined valve, nor do I see that there is any thing extraordinary in the situation of the Lodiculæ.

It is probable that two species have been confounded: the present or rather the Suddyah plant has the outer palea of the hermaphrodite flower bifid and a short, arista or mucro with a pubescent apex arising from the sinus.

2. *Andropogon Iwarancusa,* Roxb. Fl. Ind. 1 Kunth Agr. 1-493.

Gramen erectum 3-5 pedale: contusu odor aromaticum grate citrinum effundens. Culmis solidis lævibus vaginisque limbo brevioribus glabris. Ligula maxima lacera, fol. 1-2 pedalia linearia angusta, apice subulata glabra, supra lineata, nervo centrale depresso albido marginibus cartilagineis antrorsum denticulatis. Panicula subsecunda foliosa, ramis nutantibus ramulisque filiformibus glabris.

Spiculis geminatis basi bractea membranacea brunnescenti suffultas, rachibus villosis.

Flosculi geminati, altero sessili hermaphrodito altero pedidicellato masculo, terminalis ternatus, sessile nempe unico masculisque stipitatis, duobus.

Gluma exterior superior lanceolato-oblonga membranacea, planiuscula nervis 2, viridibus 3-tio intermediæ apicem versus tantum completo interdum superaddito, marginibus supra medium subulatis. Scabris apice bifida. interior inferior ejusdem consistentia minor carinata, 3-nervis, nervis carinæ tantum conspicuo marginibus involutis hyalinis.

Paleæ 2, hyalinæ, exterior (interior) angustissime apice bipartita, subciliata, sinu aristam subflexuosam flosculum duplo superantem gerente, 1-nervis, laciniis apicis subulatis, interior (exterior) multo major lanceolata, marginibus *imis* involutis ciliatis, enervis.

Lodiculæ 2, cuneatæ, margine apicis potius supero subdenticulato. Stamina. 3.

Styli 2. Stigmata plumosa ratione styli subæqualia.

Arista medium supra tantum denticulata.

Glumæ flores stipitati, subconformes, sed exterior nec margine subulat et sub 9-nervia; interiorque carina minus prominula.

Palea exterior v. interior lodiculæ staminaque ut in hermaphrodito.

In colliculis, near *Sylhet*: *October 4th*, 1835.

Glumarum situs primo aspectu reversus ut interior cui palea aristata.

Stamenque tertium opposita inferior est, ordinatioque igitur normalis, vix Andropogon versus, ob defectum flosculi neutrius; ob que flores masculos unipaleaceos.

3. *Andropogon aciculatus*, Roxb. Fl. Ind. 1·266. *A. acicularis* Kunth Agr. 1-505.

Gramen rigidum erectum 1-2 pedale. Folia vaginis lævibus.

pubescentibus vel subglabris limbo lanceolato lineari-acuta, 2-3 unciali basi subcordato, margine conspicuo denticulato. Culmis, simplicibus vel sæpius 2 ramosis, vaginis foliorum quarum limbi obsoleti fere omnino vestitis. Panicula ovata, terminalis, spiciolis *simplicibus* vel solitariis pedicellatis, pedicellis filiformibus summis exceptis verticillatis earum axillis glanduliferis, angulatis sursum incrassatis, et hispidis : omnibus 3-floris.

Spiculæ 3-floræ, floribus 2 stipitatis, masculis 1 sessili semper externo quoad plantæ axim : hermaphrodito.

Fl. masculi in apice pedicelli articulati. Glumæ 2 subæquales rubræ acuminatæ muticæ membranaceæ, exterior 3-nervis, nervo dorsali denticulato interior minus acuminata apicemque versus tantum secus nervo medio denticulata, 3-nervis.

Palea exterior membranacea subnavicularis acute mutice marginibus ciliatis, 2-nervis, venis valde irregularibus, sub omnino deficient, interior oblonga plana glabra, subintegra duplo minor : lodiculæ 2, cuneatæ truncatæ.

Stam 3. Rud.-Fæm. O.

Flosculus exterior neuter ; 1 paleaceus, palea oblonga membranacea ciliata, binervis, marginibus introrsum, vel intus quoad axim floris involutis. Hermaph. Glumæ subconformes minus coloratæ, exterior binervis, bicarinata bimucronata carinis denticulatis, minor, interior longius aristata, 1-nervis, apice sub. 3-nervis.

Flos exterior neuter 1-paleaceous ut in mare, interior ; hermaphrod. bipaleaceus.

Paleæ ut in musculo sed exterior longe aristatâ, arista denticulatâ.

Lodiculæ etc. ut in mare.

Styli 2. Stigmata plumosa ratione styli longissima.

Stirps in pratis vel campis siccis vulgatissima aristis præ alia vulnerantibus.

Ob. Inflorescentiam Holcis associandus monent. Br. Pr. Fl. Novæ Holl. 1-199 (55).

Situation and alternation of parts Pl. CXXXIX. Fig 159.

a. Gluma exterior.

b. Interior.

c. Palea interior binervis floris neutrius.

d. Palea exterior floris hermaph.

e. " interior nana.

f, *f*. Lodiculæ.

g, *g*, *g*. Stamina stigmata.

4. *Andropogon.*

Procerum, 10-12 pedale, internodiis vaginas superantibus, culmis compressis solidis.

Paniculis nutantibus axillaribus terminalibusque 2-4 confertis, quarum hac culmo proxima semper major, quæque exterioribusque multo minoribus, quæque basi squama spathacea involuta, squamis paniculæ magnitudine conform. Panicula partialis iterum iterumque eodem more composita: sed parum extimæ sæpius e spica unica format. Pedicellis spicarum medium supra articulat. ibidemque bractea spathacea foliacea suffult. Spicæ pluri-floræ, spiculæ geminatæ flore altero sessile altero stipitat. horumque duo infimi semper.

3 tiæ spiculæ flos. sessilis hermaphrodit, ut etiam terminalis que flosculis 2 similibus duobus infimis stipitatis stipat.

Gluma exterior floris infima *stipitata* exterior convexiuscula membranaceo-chartacea multi-striata venulis angusta lanceolata apicem suboblique et in cuspidem complanat brevem abeuns, secus partem marginem involutarum denticulata, interior magis membranacea 5-venia, marginibus præsertim apicem muticum versus ciliatis. Paleæ 2, hyalinæ muticæ, exterior apicem versus ciliata 1-venia, interior nana angustissime-acuminata evenia staminibus 3-tio 2 internis alternant. Stam. 3. Lodiculæ 2 cuneatæ elongatæ, denticulatæ, palea major 1-venia inclusa.

Palea flosculi alterni neutrius paleæ majori masculi consimilis.

Hoc modo formantur glumæ perianthioque omnia viridia: vel florum 2 infimorum unici stipitate floris hermaphroditis tertii et 2 terminales floris hermaph. terminalis, sed a basi spiculæ supra glumæ magis magisque acuminatæ.

Rachis ad basi florum hermaphrodit barbata ferugineis pilis.

Gluma exterior floris hermaphrod. navicularis e carinata mutica, fere cartilaginea 1-venia, externe pilis brevibus rigidis ferugineis omnino tecto, marginibus valde involutis interior minor, sed secus lineam centralem tantum hispid.

Palea exterior lanceolata hyalina glumæ interiore arcte (invested,) 1-venia, apice attenuato in aristam palea paulo excedent scabram rectam, interior lanceolata nana hyalina e venia. Lodiculæ 2 maximæ oblongo-cuneatæ. Stam. 3. Styli 2 ima basi coalite stigmata plumosa ratione styli longa subsimplicia Palea flosculi exterioris neutrius oblonga margine ciliata, breviter hyalina mutica e nervis.

Palea exterior floris hermaph. interd. aristato mucronata, dorso pilosa, ob ore glumam internam referens, vix dubito qui altera specis est, ut etiam ob vaginas ciliatas nodis basi barbatis obque glumas aureo-nitentis. *It. Ass.* 291 *a.*

Suddya'h alibique: *January* 2*nd*, 1836.

5. *Andropogon Castratus.*

Gramen basi decumbens radicansque, internodiis sanguineo-rubris vaginas excedentibus nodis glabris, vaginis laxis, striatis secus margine externe *alternantum* ciliat., summis limbos excedentibus, foliis linearibus, a basi supra attenuatis acuminatisque pilosis, pilis longis basi bulbosis rigide valideque ciliatis. Spicis geminatis longe pedunculatis, solitariis, (I mean as to the peduncle) axillaribus et terminalibus, pedunculis basi vaginatis squamosus, vagina inclusa. Spicæ geminatim digitatæ filiformes biunciales, floribus omnibus solitariis sessilibus basi pilis brevibus albis tinctis, rachi cæterum glabriuscula.

Glumæ muticæ brunneo-sanguineæ cartilagineo-osseæ, ex-

terna planiuscula, 9-nervis, nervis viridibus, muricata lineis 5, quarum interne navicularis subcarinata muricata, 3-nervis.

Palea exterior navicularis membranacea rubra apice marginibusque apicem versus hyalinis, ciliata, apice obscure bidentata, basi paulo supra aristata, arista medium supra tantum scabra denticulataque, cæterum et etiam in parte exserta tortili glabra, interne nana fere omnino colorata longiuscule ciliata quasi ventricosa, apice obsolet bidentata. Lodiculæ 2, cuncatæ. Stam. 3, non visi. Styli basi coalita partem coalit. supra demum serpi. ovar. parte infera persitent coronat.

Palea flosculi exterioris neutrius oblonga a medium supra ciliata, marginibus partim ciliatam secus hyalina cæterum colorata indistinct 1-venia.

Rudiment stipiliforme floris stipitat *gerens* adest glumæ exterioris margini exteriore quaod rachi adpressum, flore terminale utrinque rudum. adest.

Suddyah in Campis graminosis : *January* 2*nd*, 1836. *It. Ass.* 292.

A. spicis geminis ternisve : foliis pilis rigidis ciliatis; floribus solitariis, rudimento stipiliforme adjecto, glumis; muricatis.

ISCHÆMUM.

1. *Ischæmum.*

Gramen minimum 2-4 unciali erectum, basi rubescens, vaginæ laxæ striatæ, fol. distiche, subuncialia, seniora subconduplicata basi subcordata, marginibus scabris, ligula lacera, spiculis axillaribus in pedunculis insidentib. et folia spathaceo fere omnino obtectis.

Pedunculus clavatus apice cellulosus. Spicæ abbreviatæ. Rachis vix articulata excavata, excavationibus binis, ciliatis terminalis incluso. Flores 3, flosculi terminali 2, stipitatæ-1 sessilis, flore inferiore 2, tantum, unico stipitato.

Flos stipitat, flosculi inferioris tabescens aristatus.

Floris sessilis gluma exterior dorso planiuscule apice bifida,

scabraque, interior carinata 1-venia, secus carina scabra, acuta.

Palea interior ad basin fere usqueve bipartita, sinu aristam longissimam, medium supra scabra gerenti. Interior, integra membranaceo-hyalina, semen involvens, enervis. Potius pericarpium oblongum angustum. Embryo, paleæ aristatæ opposit.

Flores tabescentes ad gluma exteriore redact gluma hispida, apice aristata.

Excavationum margines membranacei ciliat; flores articulati saltem hermphrodit. Situs palearum opposit, inversus: palea aristata nempe glumæ interior.

Ex charac. acced. videtur I. *fragili*, Br. Prodr. 61, (205). Notu dignum ob suppressionem, floscule exterioris floris sessilis, et flores stipitatus *terminalis* binus et ob corum magnam redactionem.

In arenosis, *Bogapanee*: *November* 5*th*, 1835. *It. Ass.* 200.

2. *Ischæmum*, Erectum 4-5 pedale, fol. pubescentibus, spicis conjugatis paniculatis, rubescentibus.

Inter *Nunklow* et *Nowgoung*: *November* 18*th*, 1835. *It. Ass.* 276.

3. *Ischæmum*, Culmis ramosis decumbentibus, ligulis brunneis pilosis. spicis compressis patentissimum secundis racemosi dipositis.

Nunklow et *Nowgong*: *November* 18*th*, 1835. *It. Ass.* 271.

4. *Ischæmum*, Pl. CXLVIII. Fig. I.

Gramen decumbens, basi radicans, culmis spithamæis, ascendentibus, fol. lineari-lanceolat. acuta, utrinque pubescentia, basi pilis longis hispida ciliataque, vaginæ laxiusculæ, ligulæ, subintegræ truncatæ, pilosæ.

Spiceæ geminatæ, altera infima, abasin florifere altera prio-

rem vix excedens, pedunculata, flores geminati, alter sessilis, alter stipitat. *terminali geminato.*

Glumæ, cartilagineæ valva exterior inferiorque dorso pilosa rubra, sub-bicarinata apice bifida, venis viridibus 2, lateralibus in acuminibus paullo excurrentibus, carina denticulata scabra, venulæ transversè irregulariter nexæ.

Interior navicularis vix colorata, obsoleto-bicarinata, apice irregulariter bifida, lacinia 5, unica breve aristæforme.

Corolla bivalvis hyalina (flosculi interioris,) valvula exterior subnavicularis, apicem versus utrinque, quasi dilatata, ebidemque ciliata, apice bifida vena unica in aristam basi glabrata apice versus denticulatam ; valvulam ipsam paullo excedentem excurrente.

Interior multo minor, emarginata, dorso planiuscula marginibus suavicurvis breviter ciliatis.

Lodiculæ 2, carnosæ cuneatæ, margine *supero* denticulato potius crenato irregulariter.

Stam. 3. Antheræ aureæ.

Styli 2. Stigmata plumosa, ratione stylorum longiuscula, ramis subulatis rubris, obsoleto-denticulatis, ovarium ovatum, læve.

Flosculus exterior masculus, bivalvis, valvis hyalinis, valvula exterior oblonga navicularis apice versus ciliata, integra interdum 4-venia ! venis nempe 2, hinc centralis quæ paullo intra apicem evanescit.

Interior dorso planisuscula, marginibus valde incurvatis, bivenea, venis scabrellis.

Lodiculæ 2. Stamina 3.

Insertio florum superior vix, infimorum præsertim infima hispido-pilosa. Raches stipitisque vel hispidæ vel glabratæ.

Assam. Versus *Joorhath March* 5*th*, 1836. *It. Ass.* 411.

5. *Ischæmum rugosum.*

Gramen pedale vel 1½ pedale, culmis ramosis geniculatis gracilibus, glabris, geniculis barbatis, vaginis longis laxius-

culis pilosis, inferioribus limbis brevioribus, foliis linearibus, acutissimis, utrinque pilosis, marginibus scabrellis collis nudiusculis, ligulis oblongis, demum bifidis bipartisve, spicis terminalibus erectis geminatis adpressis, sub-biuncialibus.

Rachis articulata, articulis sub-3-gonis, angulo sertio piloso cæterum glabris. Spiculæ basi pilosæ, ut etiam pedicelli.

Glumæ exteriores viridescentes *venoso striatæ* marginibus purpureis, ciliatis. Spiculæ sessilis apice excepto transverse rugosæ, ibidemque cartilagineo-corneæ stipitatæ sæpe e rugosæ. Flosculus exterior 2 paleaceus. Palea hyalina concava exterior 3-venia, subciliata, interior incomplete bivenia. Interioris hermaphroditi, palea exterior 3-venia, venis lateralibus in centrali ad basin aristæ confluent, hyalina bifida, sinu aristam longam paleam 5-plo excedentem, basim versus glabrum, atratamque cæterum scabram carneo-fuscescentem flexuosum, siccatione geniculata subito exserente arista demum labenta. Interior, incomplete bivenia, 3 brevior marginibus involutis.

Lodiculæ magnæ scalpelliformes, integræ. Stam. non vidi. Styli basi distincta. Stigmata plumosa.

Flos. stipitat. sæpe aristatus, sæpius muticus, sæpe omnino abortiens, interdum interior hermaphroditus. Paleæ interior flos interioris hermaphroditis evenia. Ovario semper? abortiente. Caryopsis oblonga, subsessilis, paleis arcte involuta, stylorum basibus imis terminata teretiuscula.

I. Rugosum, Linn. Roxb. Fl. Ind. ed. Carey. 1-322. Kunth Agr. 513.

Spiculæ sæpius paleis membranaceis pedunculos basi involventibus expertes.

I. Rugosum. Erectum ramosum, culmis geniculatis, geniculis barbatis, vaginis laxis foliisque linearibus pilosis, ligulis bipartitis. Spicis geminatis, glumis exterioribus corneis, transverse rugosis. (Spiculis pedicellatis sæpius tabescentibus). In campis humidis prope *Suddyah: June 27th,* 1836. *It. Ass.* 11.

6. *Ischæmum.*

Elatum, 6-8 pedale gracile strictumque ligulis integris collis parce barbatis, foliis linearibus accuminatissimus basi altenuatis quasi in petiolo, nervo centrale albo marginibus scabris pendentibus. Spicis compressis filiformibus spicato-paniculatis, ascendentibus patentibusve post anthesin coarctato-erectis, glumis fusco-brunneis. Barba sericea alba.

In graminosis, *Nunklow*: *November* 17*th*, 1835. *It. Ass.* 263.

Appendix—Gramineæ.

Alopecurus otiporensus, Gr. Pl. CXLIII. Fig. I.

1. Branch of Panicle.
2. Locusta, glumes spread out.
3. Flower the rudiment of a second visible.
4. Inner Palea. 4 a. Do. section shewing its form and venation.
5-½ inner Palea. Lodiculæ. Genitalia and rudiment which is on the wrong side.
6. Rudiment evidently of an outer palea.
7. Lodiculæ and bases of filaments.
8. Lodicula.
9. Portion of Style and stigma.
10. Partium situs et alternatio.

LAMARKIA.

1. *Lamarkia Hookeriana*, Gr. It. Not. p. 349. Num. 106. Pl. CXLIII. Fig. II.

1. Plant natural size.
2. Branch of inflorescence.
3. Sterile locusta.
4. The other sterile locusta, *a*. this should be outside.
4. *a*. Its abortive hermaph. locusta.
5. Hermaphrodite locusta.
6. Inner view of inner Palea, lodiculæ spread out.

6. *a*. Ditto ditto more enlarged, and genitalia.

7. Fistitlum.

Affghanisthan Otipore: 1840.

PSILURUS Trin.

1. *Psilurus rottbœllioides* Gr. Pl. CLIV. Fig. I.

Gramen: gracil. spithamæa parva ramosa, fol. setaceis, vaginis laxisuculis, ligula obsoleta. Spica erecta simplex (vere composita.)

Rachi scabrell. subangulat.; floribus opposit. concava. Flosculi solitarium rachi adpressi, rudimento stipitis alternis.

Gluma unica (superior) nempe palea interior opposit, cartilaginea, basi incrassat:

Paleæ 2, exterior cartilaginea chartacea, in aristam longam acuminat. concava, e carinata pluri venia.

Interior minor mutica, venis 2 viridibus ad venas subcartil. cæterum membranacea. Lodiculæ massæ 2, sæpius bilobæ; lobis minoribus. (next the axis.)

Stam. 1: paleæ exterior oppossit.

Stylus sub O. Stigmata plumosa: ovarium apicem obliquum.

Caryopsis oblongo-clavata.

Flos. semper clausus. Variat asperilæ paleæ exteriorus et magnit. antheræ. Gravelly ground at the base of sloping glacis. Otipore. Very common.

1. Plant natural size.

2. Locusta and portion of rachis.

3, 3. Ditto viewed so as to shew the opposition of the glume to the inner palea.

4. Flower side view and rudiment of a stalk of another.

5. Ditto spread out.

6. Inner view of inner Palea and Lodiculæ.

6. *a*. Transverse section of Palea.

7. Single anther and lodicula.

8. Genitalia and lodiculæ at an early period.

9. Anther.
10. Lodiculæ.
11. Ovarium and base of style and stigma.
12. Immature caryopsis.
13. Portion of rachis and glume, flower removed.

Pl. CLIV. Fig. II.

Gramen pusillum. 4-5 unciali, foliis parva pilosis linearibus: vaginis longis ligula O, nisi pili per eam existimes.

Panicula erecta viridescens, divisiones infimæ ramosæ, omnes ascendentem. Locustæ plurifloræ. Glumæ chartaceæ, marginibus membranaceis muticis pluriveniis, exterior major.

Palea exterior concava, chartacea, margine et apice membranacea, bifid; arista setiformi minimo interjecto; patens, ambæ dorso pilosæ.

Inter: rachi flexuosæ applicit. integra mutica membranacea evenia: marginibus leviter inflexis.

Stam. 3. Lodiculæ 2. Stigmatum divisiones asprellæ, vel denticulatæ.

Notu dignum ob directione paleæ interioris, et hujus *evenia*; signis duobus analogiæ cum Rottbœllioides quibusdam.

Habitus Festucæ.

1. Locusta.
2. Do. Glumes removed.
3. Flower.
4. Outer Palea.
5. Inner do. and genitalia.
6. Pistillum. Lodiculæ and bases of Stamina.
7. Lodicula.

Sorghum.

[*Sorghum*. Gluma externa foliacea coriacea transversa, alteram involvens, pilosa plurivenia, apice membranacea mutico.

Alter involuta coriacea glabra involute parte apice pilosa, venis paucis. Paleæ membranaceæ, pilosæ hac glumæ inter-

næ, opposita major, exterior pilosa. Altera interior minor, biloba, sinu aristigera.

Altera tertia interior lineari-lanceolat. Lodiculæ carnosæ integræ apice pilosæ. Stam. 3. Stigmata aspergilliform.

Palea fl. neutrius bivenius. Palea externa fl. hermaph. plurivenia, venis axilibus in *aristam convergent.*

Palea interior avenia. Spicæ bilocustigeræ, locusta altera stipitatim sterili. Paleæ 2, *interna fl. neuter, externa fl. Hermaph.*

Habit a good deal peculiar ;--allied to Phalaris ?

Zoysia pungens. The inner palea appears to be wanting in the Serampore specimens.

The structure is thus* or outer glume wanting, so that the Perianth seems certainly inverted, for the outer palea ought to be opposed to the inner glume.

It certainly has the structure and consistence of Andropogon, although the appearance of the spike is rather Rottbœllioid.

Rottbœllia Thomæa Oropetium.

Certainly seems to approach to Chlorinæ. Glumæ 2, inferior (interior) minute membranacea. Superior (interior) cartilag. acuminata, margine basi membranaceo-auriculat. Paleæ submembranaceæ ; exterior (interior) navicularis, trinervis ; interior (exterior) bicarinata, bimucronata aristatat. Rachis flexuosa, plana, spiculis exacte lateralibus, ad flexuras solitariis unifloris.

The inversion in this has reference only to the axis, it appears to me to belong as much to Chlorinæ as to Rottbœllinæ, or more, for in these last the less developed flower is opposite the outer glume, in this the direction of development is centripetal, in the others it is centrifugal.

Mr. Brown sub Microchloa says, that R. Thomæa is an un-

* Sketch omitted.

described genuis, and attributes to it one glume ; this must be the inner membranaceous one, and the inner glume will then be the outer unipaleaceous glumoid neuter flower, the outer glume being altogether abortive.

Rottbœllia. Spica articulata crassa, aspectu albo suberosa, articulis bifloris, inferior major magis immersa alba, superior sessilis obcoalitione pedicelli cum rachi minor, minus immersa, atro-viridescens. Glumæ bifloræ fl. inferior 2, exterior planiuscule, cartilaginia, mutica, fere emarginat. margine induplicatum, venis crebris, ideoque aspectu primo bivenia ; interior acutiuscule omnino immersa cymboideo-cochleariforma, subcarinata, carina obliquuscula ob pressione pedicellum ; fl. superior neutrius. Flos in sinu glumæ exteriores neuter, bipaleaceus, paleæ chartaceæ muticæ, ext. trivenia, inter. bivenia. Lodiculæ valde venosæ. Stam. bipaleacea in sinu gl. interior hermaph. Paleæ hyalinæ teneræ, exter multo major trivenia, inter plana subevenia.

This species is at once distinguished by its stout spongy or corky looking spikes, and in the dried state, by the contrast in colour of the tabescent flowers, it appears to be a genuine Rottbœllia, and comes near the Hermarthria.

Rottbœllia perforata. Comes close to Ophiurus, from which it differs in the oppositely bi-flowered articulations, the comparative flatness of the inner glume, the outer flower unipaleaceous and neuter, the outer palea of the hermaphrodite 3-veined, although the central vein is the smallest.

Endlicher in his Genera makes out from Kunth, that there is only one glume, and that the spicula consists of 3 flowers, two sterile, 1 paleaceous, the terminal one hermap. bipaleaceous.

For this hypothesis, I see no reason, unless it be applied both to Hemarthria and Ophiurus, in both, which the inner glume has a membranaceous consistence. Possibly also Kunth has been guided by the tendency to the inner glume

having an incomplete central vein; besides, this hypothesis is against the direction of the development of the glumes, the outer of which Mr. Brown states to be most persistent. Is the spike really conjugate? else how do the spiculæ flowers which are opposite, face the lines on the rachis.

The apex of the spike seems to point out, that the structure is as in Hemarthria, the pedicel of the second flower being incorporated with the rachis.

If this is the case, it differs from Hemarthria in having the pedicellate flower hermaphrodite.

The marked articulation below both flowers is an objection to this, although there is a tendency to confluence in Hemarthria in that part of the spike in which the joints are 1-spiculate, the other flower is to be considered as completely abortive, and there is no tendency as there is above, in the adnate pedicel to become produced beyond the next articulation.

Even with this explanation, the length of the spore amounting almost the continued superposition of the spiculæ, is remarkable.

Two species, or perhaps more, exist under this head, two among the grasses given by Wight, in the one the stature is small, in the other large, spikes axillary, it is curious that in this, both spiculæ do not project equally when dry as they do in the former, *it appearing to be a general rule that the upper spicule does so most.*

Ophiurus, Spica articulata articulis unifloris, floribus alternis immersis. Gluma exterior mutica cartilaginea, plana convexiuscula, interior hyalina submembranacea, cymbiformis mutica.

Fl. 2 exterior masculus. Paleæ hyalinæ 2, muticæ. Exterior multo major bivenia! interior planiuscula, magna involuta bivenia. Lodiculæ parvæ. Fl. inter hermaphrod. Paleæ 2 mutiæ, hyalinæ; exter. bivenia! concava, inter. planiuscula margine involutis bivenia.

Differs from Rottbœllia in articulis unifloris, consistentiæ tenerior glumæ interioris, paleisque exterioribus florum biveniis!

Ægilops ciliaris, Spica articulata, inexcavata, articulis bifloris, floribus sessilibus difformibus. Fl. exter. biflorus. Gluma exterior planiuscule cartilaginia plurivenosa margine serrato ciliata, apice dilatata membrana emarginata.

Gluma interior lanceolati-acuminata, carinata.

Fl. exter. masculus. Paleæ muticæ pilosiusculæ, magis involutæ, major exterior bivenia. Interior similis minor bivenia.

Fl. interius hermaph. Paleæ 2, hyalinæ, exterior paullo latior muticæ, utraque incomplete bivenia. Lodiculæ 2. Stam. 3. Styli basi dilatati-coalita.

Very distinct from Rottbœllia in habit, also in great dissimilarity of spiculæ, which are both sessile, rachis not excavated, only flexuose venation of paleæ and dilatation of base of styles. Fl. alter tabescens.

The flowers are likewise unilateral, particularly the hermaphrodite spiculæ.

Manisuris Myrus, Spica articulata, articulis bifloris; rachis floribus sessilibus sub-dissimilibus, excavato.

Inferior minor directione quoad axin oblique, gluma exterior planiuscula cartilaginia, margine membranaceo hinc apice obliquo interior navicular. apice crista majuscule in carina.

Floscul. externus bipaleaceus neuter. Paleæ muticæ, majores, hyalinæ biveniæ. Fl. interior hermaph. bipaleacea. Palea hyalina exterior navicularis, 3-venia, interior angusta avenia. Lod. 2 integriusculæ parvæ. Fl. super. major. stipite brevissimo. Gluma exter. cartilagineo-ossea, planiuscula, margine membranaceo-emarginato-biloba, lateribus utrinque infra medium inversis. Gluma interior minus dura, naviculari-concava.

Fl. exter unipaleæ neuter, palea magna hyalina mutica bivenia; inter. bipaleacea hermaphrod. Paleæ exhyalinæ muti-

cæ, exterior subconcavo-carinata, 3-venia; interior minima. Lodiculæ magnæ.

The male spicule is certainly inferior, but it does not belong to the same joint of the rachis with the hermaphrodite, as the lowest joint, and general analogy shews.

The males are biseriate, the females uniseriate. This is a remarkable genus.

The characters of Kunth's Manisuris are not in the least applicable to this, which is his second species of the genus!

At the base of each hermaph. outer glume is a transverse foveola.

Fl. masculus *Ophiuri* et *Hemarthriæ* quoad pedicellum.

Hermaph. Hemarthriæ, palea interior fl. hermaph. minute.

Manisuris granularis.

Spica flexuosa. Spiculæ dissimilis. Spicula inferior sessilis; obovato-rotunda, gluma exterior ossea, scrobicul. obtusissime concavissima.

Interior subnavicularis, multo minor, carina apice incrassato in cristam.

Flos minutus ratione glumarum. Fl. exterior neuter, palea 1 maxime circumvoluta circum florem.

Fl. superior hermaphrod. Fl. superioris glumæ foliaceo-chartaceæ venosæ, similis, inferior marginibus membran. obliquis altero eroso-fimbriatove, altero integro superior navicularis carinatissim.

Palea externa maga circumvoluta bivenia.

Interior avenia circumvoluta.

Manisuris, is allied to *Peltophorus,* from which however, it abundantly differs; if the flowers are bi-paleaceous, it arises from the abortion of the inner palea of the hermaphordite or female floscule a tendency to which exists in Hemarthria and Peltophorus. The difference between the glumes of both spicules is remarkable, the male ones look like bractea interspersed on the spike, the outer glume of the female or herm. is remarkable.

Gen. Nov. Gramen Affghanense.

Spica subarticulata. Spiculis pluribus neutris, pauces fertilibus plurifloris, flore infima tantum perfecto. Glumæ herbaceæ, e basi canaliculatæ, angustæ longe aristatæ

Spiculæ neutriæ bifariæ, ad paleas glumas subsimilibus reductis ; fl. appoximatis. Spiculæ perfectior glumis ut in præcedenti fl. transversus ; palea infer cartilaginea concava pilosa in longe aristam product. interior bimucronata bicarinata

Fl. secundus approximat e paleis 2, illo similib. sed minor.

Fl. reliqui, longe stipitat e paleis exter longe aristatis, approximatis.

To be examined again. So far as books go, the odd points seem to be the mixture of barren and fertile spiculæ ; the approximation of the neuter paleæ, ***shewing great abortion.***

Comes near Hordeum.]*

* Within brackets from Pp. 96 written in pencil. *Ed.*

CYPERACEÆ.

ANASPORUM.

Anasporum monocephalum, Nees ab. E. Wight's Cont. 1-92. Cyp. monocephalis Roxb. Fl. Ind. 1-193.

Herba paludosa, culmo pedali (vel 1½) obtuse 3 gono. fol. linearia longe acuminata culmum æquantia, vel superantia glabra, marginibus simplicibus crassis quasi truncatis. Invol: 3 phylli, foliola inæqualia, unico longissimo culmum subæquante. Spiculæ distichæ, in massas 3-4 ovatas aggregatæ quarum terminalis multo major, compressæ 6-8 floræ, basi bracteatæ, bracteæ late ovata, squamarum consistentiâ squamæ herbacea vel scariosæ late ovatæ, carinatæ, carinæ scabræ mucronatæ, demum brunneo-striatæ, sæpissime hermaphroditæ interdum abortu staminum fæmineæ. Setæ O. Stam. 3, filamenta lata persistent. Stylus simplex a rarissime lateraliter dentatus, minut. auctus (an e 2 confluentibus). Caryopsis immatura 3 gona, matura compressa obsolete 3-gona. Styli reliquis longiusculis apiculata, a medio infra solida, parte centrali stipitiformi-solidiora, et spongiosa cellulosa .etiam discolor supra fertilis, supra plana infra convexiuscula.

Jumalpore : *September* 21*st*, 1835.

Spiculæ dense congestæ in capitulum conico pyramidali, 3-4 partitum.

(An genus proprium, *Cephaloschæno* affine discrepans absentiâ setarum et forme structuraque caryopsis ?)

Ob structura ovarii par caryopseos spongiosa, minime pro perigynio habenda. Pars spongiosa cum angulis certe continua, et altius currens.

Roxburghii descriptio præ alios bona. Ovarium apice scabrellum, basi angulis 3 obtusis prominulis. De origine, partis cellulosæ dubito, in caryopsi immatura certe perigynum videtur.

Fimbristylis.

1. *Fimbristylis polytrichodes*, Vahl. Nees ab E. in Wight Cont-1-96 in *Scirpus scaber* Roxb. Fl. Ind. 1-222.

Planta cæspitosa parvula 4 uncialis. Culmus glaber subangulatus lineatus, foliis longior; folia disticha linearia angusta, vaginis membranaceis. Spica solitaria terminalis subnutans sessilis, ovata obtusa involucro setiformi basi dilatato scarioso, spica breviore dorso vel postica stipat. Squamæ late, ovatæ scariosæ fusco-carneæ 1-nerviæ breve obtuseque mucronatæ, infima (an semper?) vacua. Stam. 3, filam: compressis. Anth. erectæ basi affixæ; 1-2 aliquando abortientes. Setæ hypogynæ O.

Ovar: breve crasseque stipitat; obovatum compressum antice posticeque convexiusculum (at magis antice) obsoletissime 3-gonum. Stylus basi valde dilatata, compressa excavata cum apice ovarii articulat. Stigmata 2. Pollen angulatum.

In arenosis nuper inundatis, paulo infra, *Jumalpore*: Legi *September* 14*th*, 1835.

Situation and alternation of parts Pl. CXXXIX. Eig. 130.

a. Axis.
b. Squama.
c, c, c. Stamina.
d, d. Stigmata.

2. *Fimbristylis podocarpa*, Nees ab. E. Wight Contr. p. 98.

Spicæ umbellatim paniculatæ, ovata-conicæ undique imbricatæ. Squamæ ovatæ, fertiles omnes scariosæ 1-nerviæ, e carinatæ, nervo breve producto mucronatæ; Setæ O. Stam. 1-2, lateralia! Filam. exserta complanata. Anth. bilocul. Pollen angulat.

Apice ex apiculatum; conicum in bulb. excavationem receptum; Stylus basi bulbosus. Stigmata 2, hispida.

Pericarpium obovatum, obtuse trigonum (stipite lato cuneato) "crenata costulatum" punctis depressis interjectis. "Compressum" potius postice convexum, antice planum, "obtuse marginatum."

Herba spithamæa pedalisve, foliis subtortis, linearib. obtusis acutisve culmis compressis striatis lævibus breviorib. involucro umbella superante. Squamis apices versus (nervo medio excepto) brunneis.

Legi com præcedente: *September* 13*th*, 1835.

Partium situs et alternatio. Pl. CXXXIX. Fig. 123.

a. Squama *singula* antica.

b. Axis imaginaria.

c,c. Stamina, si 1 vel. 2 semper lateralia.

d,d,d. Angulæ ovaria.

e,e. Stigmata, angulis 2 anticis opposita.

Isolepis.

1. *Isolepis lupulina.* N. ab. E. Wight Contr. 1. p. 107.

Planta 4-5 uncialis, culmus basi vaginatus, vaginâ oblique fissâ teretiusculus lineatus ultra spicularum confer. continuatus in involucro ? teretiusculo acuto culmum subæquante, dissepimentis transversis distantibus. Spiculæ 3-4 confertæ ovatæ ventricosæ.

Squamæ ovatæ ventricosæ scariosæ muticæ nervosæ acutæ lutescente nitidæ subcarinatæ omnia infima forsan excepta hermaphrod. fructus patentus: Stam. tria angulis ovarii opposita. Filamenta cellulosa capillaria exserta; antheris lapsis persistentia et setas hypogynas mentientia. Setæ hypogynæ O.

Ovarium obtuse 3 gonum, angulo singulo postico. Ovulum 1, erectum. Stylus filiformus 3 partitus. Stigmata totidem. Pericarpium immaturum 3-angulare, transverse rugosum, styli

decidui ima basi quasi apiculatum. Testa membranacea solubilis.

I. Roylei et lupulinam intermediam esse videtur. Neesius speciem priorem a siccis forsan descripsit.

Partium situs et alternatio. Pl. CXXXIX. Fig. 86.

a. Axis.

b. Squama.

c, c, c. Stamina.

d. Ovarium cujus angulus singulus, squame opposit.

2. *Isolepis supina*, Br.? Sub cont. 1-107. Roxb. Fl. Ind. 1. 219 (Scirpus).

Culmi fasciculati exteriores paulo curvati obtuse 3 goni validiusculi 1-1¼ pedales, diphylli, fol. infer limbo brevissimo subulato longe vaginant. superum vagine brevi limbo culmum æquant vel superante trigono canaliculato. Spicæ paucæ glomeratæ sessilis stipitatæve laterales ovatæ obtusciusculæ pallidæ, squamæ late ovatæ, carinatæ, mucronulatæ, carinâ virida marginibus pallidis membranaceis. Stamina 3, antheræ sub-apiculatæ; Caryopsis (immature) 3 gona transverse rugosula. Styli basi breve apiculata. Stigmata 3. Involucre culmam continuant. folio simile alterum anticum, spiculis brevius apice subulato longuisculo.

Jumalpore: *September* 22*nd*, 1835.

TRICHYLOSTYLIS.

1. *Trichylostylis quinqueangularis*, Nees ab E. Wight. Contr. p. 104.

Spiculæ ovatæ acutæ. Squamæ ovatæ (extimâ sterili) acutæ scariosæ 1-nerviæ; subcarinatæ undique imbricatæ. Setæ hypogynæ O. Stamen 1, (anticum). Filamenta filiforme, cellulosum, ovarium superans, Anthera introrsa.

Ovarium turbinatum obsolete 3 gonum minute tuberculatum apice summo conica. Stylus basi incrassatus sub-bulbosus, excavatus, cum apice conico ovarii (in cavitate nidulante,) articulatus. Stylus 3 profunde partitus, hispidus, vel stigmata tria hispida.

Caryopsis, obovato-turbinata, apiculatis brevi, obtuse 3 gona tuberculata et transverse rugosula.

Partium situs et alternatio, Pl. CXXXIX. Fig. 121.

a. Axis imaginaria.
b. Bractea antica.
c. Stamen singulum anticum.
d, d, d. Anguli ovarii.

Vix proprii generis potius Fimbristyli confungenda.

Legi supra *Sherazgunge*: *September* 13*th*, 1835.

Scirpus.

1. *Scirpus Kysoor*, Roxb. Fl. Ind: 1-236.

Descriptio Roxburghii accurate præsertim quoad numerum setarum, seta antica stamina antico opposita. Styli basis concio persistens.

Situation and alternation of parts, Pl. CXXXIX. Fig. 180.

a. Squama.
b. b. Setæ 2 exteriores.
c, c, c. Stamina.
d, d, d. Setæ 3 interiores.

Jumalpore: *September* 22*nd*, 1835.

2. *Scirpus capitatus*, Roxb., Fl. Ind: 1-218?

Annua, culmis fasciculatis basi vaginalis filiformibus subteretibus lævibus enodis, 5-8 uncialibus. Spica solitaria terminalia ovata obtusa; erecta.

Squamæ ovatæ, obtusiusculæ, nervo uno dorsali viridi carinatæ, cæterum membranaceæ ; castaneo-fusco-vittatæ. Stamen 1 laterale. Setæ 4-6 persistentes denticulatæ. Caryopsis obcordata compressa lævis, atro-brunnea; Styli bipartiti (1 interdum dente aucto) base orbiculari-depressa viridi-rugosa persistento-coronata.

Jumalpore in humidis: *September* 22*nd*, 1835.

Eleogenus Nees. ab E ?.

3. *Scirpus acutangulus*, Roxb. Fl. Ind. 1. 216. *Limnochloa acutangula* Nees. ab E. Wight's Cont. 114.

Culmi fasciculato ; simpliciformi, acute 3-goni interstitiis concavis, subulato. Squamæ 2, basin culmi vaginantes, superior major membranacea oblique truncata oblongo obtuso.

Spicula terminalis cylindracea obtusiuscula, erecta squamæ spiraliter positæ, spirâs 2 a sinistro ad-dextrum versîs, herbaceæ late ovatæ obtusæ marginibus membranaceis, viridibus brunneo-striatis. Stamina 3. Setæ hypogynæ 6, retrorsum hispido-denticulatis persistentibus tunc rigidæ ovarium olongo-obovatum. Stylus profunde 3 partitus basi bulbosa in apicem ovarii inarticulat.

Caryopsis immature late obovata fere obcordata ; Styli base conico ad apicem ovarii strangulata obtusiuscule subcartilaginea, coronata pallide brunnea lenniter costata postice tenuius interstitiis transverso striatis, setis persistentibus suffult. capsula subæquantibus vel superantibus.

Situation and alternation of parts Pl. CXXXIX. Fig. 202.

a. Squama.

b, *b*, *b*. Setæ 3-exteriores.

c, *c*, *c*. Stamina.

d, *d*, *d*. Setæ 3 interiores.

e, *e*. Capsula stigmataque.

In aquis stagnantibus *Jumalpore : September* 23*rd*, 1835.

Chætocyperus.

1. *Chætocyperus Limnocharis,* Nab. E. in Wight Contr. 1-96. Cyperus setaceus Retz.

Herba minima cæspitosa 3-4 unciatis, culmi simplices, basi folio membranaceis vaginanto, limbo parvo adpresso vestit. obtuse 4 gonis, interdum *demum* apice radicantes, vel potius proliferi. Spicule terminalis junior disticha, 3-5 flora, squamis membranaceis, 1-nervis, (nervo viridi-*carinulato*) purpureo-sanguineis, marginibus albidis infima vacua. Setæ 6, cellulosæ, retrorsum hispidæ, 3 exteriores, angulis ovaria oppositis breviores, *posticâ intermediâ* longitudine. Stamina 3, 1-2 interdum abortiva, (hoc casu stamen vel stamina lateralio). Ovarium obovatum angulis rotundatis 3, cui stamina oppo sita.

Stylus 3 partitus profunde, basi 3 gone conica, ovarii apicem tegante tantum persistente angulis ovarii angulis oppositis. Caryopsis immature rugulosa cum angulata, basi styli continua.

Partium situs et alternatio, Pl. CXXXIX. Fig. 154.

a. Squama.

b,b,b. Setæ 3, exieriores.

c,c,c. Stamina his opposita.

e,e,e. Setæ 3, interiores. Trianguli, anguli ovarii.

f,f,f. Stigmata.

Confer Prod. Brunonis illustrissimis, sub Eleochari, p. 80 (224.)

Prope, *Jumalpore* : *September* 18*th,* 1835.

In Cyperus rotundus of Roxb. *Hexastachyus* Rottbœll.

There are properly speaking no lateral scales, neither is their existence mentioned by Mr. Brown in his Prodromus. The fact is that the inner membranaceous margins of each scale, or bract, is prolonged downwards below its insertion until it reaches the insertion of the ovarium of the flower, on the op-

posite side of the rachis and immediately below it, to which it indeed forms a sort of membranous envelope. The appearance of scales originates from these margins becoming occasionally *torn*, and I think that I have observed this to take place more readily on one side than on the other. The above is true perhaps with regard to all genuine species of Cyperus. If then Kyllingia had a 2 flowered spicula, with the second originating from about the base or middle of the inner squama, as Mr. Brown has stated Prod. 1 (219) 75, where would be the difference between it and Cyperus.

Pubna river: *September* 10*th*, 1835.

KYLLINGIA.

1. *Kyllingia brevifolia*, Roxb. et ab. E. in Wight contr. 1-91 :

Spiculæ in capitulo globoso sessili dense imbricatæ, unifloræ bisquamatæ. Squamæ membranaceæ diaphanæ carinatæ 1-nerviæ, nervo prominulo carinam formante denticulato scabro, præsertim squamæ inferioris (quæ minor est) mucronatæ, superior major genitalia arctius involvens. Setæ hypogynæ O. Stam. 3 duo lateralia squamis alternantia, 1 anticum carina squamæ inferioris oppositum. Ovar. chartaceum lateraliter compressum : obtuse (antice posticeque) marginat. Stylus 1-filiformis continuis demum paulo supra basim decedens. Stigmata 2, exserta, anticum posticumque.

Pedalis ; fol. breviorib. margine scabris. Involucro capitule longe superante.

Cum præcedentibus legi : *September* 13*th*, 1835.

Monente oculatiss. Brunonio, squama major superior pro rache spiculæ abortivæ consideranda est. Ob situm partium procul dubio est, stamina et genitalia e sinu squamæ inferioris originem ducunt.

Partium situs et alternatio. Pl. CXXXIX. Fig. 125.

a. Squama minor inferior.
b. ,, major superior interior.
c, c, c. Stamina.
d. ovarium.
e, e. Stigmata.

Courtoisia.

1. *Courtoisia cyperoides Nees. E. ab.* Wights Cont. 1-92?

Culmi 1-2½ pedales, obtusiuscule 3 gona, fol. linearia acuminata, culmum subæquantia, involucrum 3 phyllum, foliolo unico, longitudine foliorum. Spicæ plures umbellatæ inferiores longiusculæ pedunculatæ.

Squamæ 2 membranaceæ, muticæ, inferiore minore vacuæ, spicula uniflora, bisquamata, squama inferior mutica *dorso* recta, 3-nervis viridibus approximatis, cæterum membranacea, marginibus apicem versus involutis.

Propria conformis dorso ventricosa, 1-nervis, nervo subinconspicuo. Stam. 3, Stylus profunde 3 partitus. Caryopsis squama propriatum inferior arcte involuta, nec adnata, superne ventricosa, oblonga obtuse trigona punctulato chartaceo-fibrosa, styli base persistent apiculat.

In humidis *Jumalpore*: *September* 22*nd*, 1835.

Alternation and situation of parts, Pl. CXXXIX. Fig. 174.
a. Squamula exterior vacua.
b. ,, interior.
c. Squama inferior, rachis modificatio.
d. ,, interior propria.
e. Stamina.
f. Anguli caryopseos.

Pl. CLXVI. Fig. II.

This plant which is probably a very young Cyperacea, I

found among some Pilularia, or rather Marsileas; its whole length did not exceed 3-4 of an inch.

It was obsoletely angular, the third angle next the axis.

Spica disticha flexiosa. Bractææ obtusissime carinatæ. Stamina 2. Ov. trigonum. Styli tres.

Planta minima; unifolia, foliam lineare concavum trivenium. Stamina entirely cellular.

ERIOCAULONEÆ.

Eriocaulon.

1. *Eriocaulon Wallichianum?* Mart.

Foliis linearibus basi dilatatis pseudo fenestratis, apice sphacelatis mucronatis pilis arachnoideis inter bases foliorum pedunculorumque. Bracteas hinc fissis, apicibus sphacelatis. Pedunculis bracteas 3-4 plo superantibus teretibus. Involucri squamis glabris reniformi-cordatis bracteolis deltoideo-cuneatis, dorso versus apicem, dorso nempe pulverulento-albis. Hab. in aquosis, corpuscula subnivea (an cellules gerentib.)

Mergue Kulwing: copiosa *August*, 1834.

Floribus masculis pedicellatis. Perianthio apice breviss. albo-barbatis, involucro demum deciduo, dehiscentia loculicida. *Mergue Herb. no.* 218.

2. *Eriocaulon*, sp.

Rhizomata annua? foliis lineari-acuminatis multinervis obtusis? basibus *arachnoideis*, vaginis folia subæquantibus apicibus longitudinaliter et per dimidiam longitudinem fissis, glabris, scapos laxe vaginantibus, scapis sesqui-pedalibus vel ultra, pilis albidis patentibus hispidis, folia 3 plo superantibus capitulis niveis sphæricis.

Bracteas externis vacuis, obovato-rhombeis ciliatis lana involutis. Interior conformis sed angustioribus et magis concavo. acuminatisque e paulo supra medium usque ad apices dense albo-barbatulatis, floribus masculis stipitatis, stipite pilis longissimis, Perianth. externo 2 sepal., sepalis adnatis hinc fissis nudis, denticulatis, *marginibus nempe cellulosis*, laciniis perianth. interior majusculis nudis, infra apicem mascula sphacelata oblonga notatis. Staminibus alternis longioribus his oppositis. Antherii magnis brunnescent., floribus fæmineis brevius stipitatis, stipite pilosiss. ut in mare. Perianth. extern. 3 sepal. sepalis lineari-oblongis acutis, subcarinatis, nervo medio *dorso* amedio supra albo barbatulo, subæqualib. Int. 3 sepal., 1 sepalis inæqualib. magis cellulosis, vix concavis, amedio supra ciliatis, apicibus irregulariter barbatulis. Ovario brevissime stipitato. Stylo $\frac{2}{3}$ 3 partito.

Floribus utriusque sexus præsertim masculis lana involutis, lane e pedicellis orto, e pilis longissimis paucissime articulatis, dein continentibus.

Hab. In humidis nuper inundatis, inter *Kulwing* et *Mergue* : *November*, 1834.

Moulmein in paludibus nuper inundatis copiosissim. *Mergue Herb. no.* 675,*a.*

3. *Eriocaulon.*

Squamis plumbeis barbulis niveis.

In aquosis, dense cæspitosa, *Assam* : *October* 12*th*, 1835.

4. *Eriocaulon glaucum*, Gr.

Rhizomate annuo. foliis linearibus, glaucis basibus arachnoideis, vaginis glaucis hinc fissis apicibus 2-dentatis. Scapis glaucis vaginis foliisque duplo longiorib. capitulis conicis cinereis. Involucri foliolis spathulatis patentib. striatis denticulatis, e barbatis membranaceis, squamis conformibus

dentatis, striatis, parce albo-barbatis. Corollis ciliatis, apicibus barbula alba minima maculaque nigrescente, *calyce simplici.*

3, 4, Uncialis, glaucescens.

Habit Paludib Mergue : August,. 1834.

Rhizomate annuo, fol. angusti-lanceolatis basibus arachnoideis: vaginis longioribus, scapis, 3-4 pollicarib, vaginis foliaque superantib., capitulis hæmisphericis cinereis, involucris squamis nudis bracteolisque spathutatis, denticulatis, bracteolis ad apices parce albo-barbatulis, calycibus nudis : corollis fæmin. ciliatis, cum masculis apicibus barba minima alba maculaque nigrescente. *Mergue herb. No.* 254.

On the Anatomy of Eriocauloneæ.

The axis in most species exists in the shape of Rhizomata : in one instance, (*E. setaceum*) the only instance with which I am acquainted, it is really caulescent, and occasionally branched. In this species it consists of a central vascular part, the space between this and the cuticle being occupied by a vast quantity of irregular air cells. By air cells, I mean those cavities which apparently contain air, and the parietes of which are built up of cellular tissue. The Rhizomata offer nothing worthy of notice. The roots are in general, simple.

With respect to the structure and distribution of vessels, they appear without exception to be destitute of spiral vessels ; a curious fact, since they rank tolerably high in the scale of vegetation. The place of these is supplied by ducts, which occur aggregated in distinct fascicles, and surrounded by cellular tissue of a more or less elongated form. They are occasionally, but not freely unrollable, and probably have been at an early period spiral vessels.

It is well known that many plants are furnished in their latest developed part with spiral vessels, while ducts only are found in the older parts. This is particularly the case

with Ferns, the gyrate portions of some of which abound with spiral vessels. Mr Valentine finds them in the roots of the hyacinth, but only towards the point.

I shall take the leaves of the *E. setaceum*, as the type of the foliaceous formation, since it is evidently here reduced to its simplest state; premising that the whole of this plant, with the exception of the sheaths and peduncles, is invariably submerged. The leaves of this species are subulate, but some what compressed on the inferior surface. They are green on the superior, colourless on the inferior surface.

They are hollow from base to apex, and divided along the mesial line by the central, and only nervure, which is connected by cellular tissue with both cutes, separating it into two distinct tubes; numerous transverse septæ attached circularly to the parietes of each tube, complete their division into chambers. The parenchyma, is confined entirely to the upper half of the cutis, and central longitudinal dissepiment, and what is very remarkable, there is no apparent line of demarcation, or any thing to indicate the cause of such an abrupt cessation. It consists of ovate colourless vesicles (cells) which include a variable number of highly green globules, themselves composed of granular bodies. These globules are variously arranged, either forming a central nucleus, or adhering in groups to the parietes of the vesicles, which some times are nearly full, some times only half filled. They are arranged in one series with the most beautiful regularity into lines which run longitudinally from base to apex. As from their shape, they can touch each other by their greatest convexities, small colourless spaces are left between them, corresponding to their least convexities, through which the cutis is visible. They are arranged along the body of the cell of the cutis, so that the lines of junction of these are likewise disposed with great regularity, alternate with the lines of the vesicles.

The middle nervure is of analogous formation with the vascular fascicles of the stem.

The septa are attached to the parietes of the tubes, and to

the middle nervure, to which they adhere more forcibly, and generally separate with it when force is applied. They appear to be flat membranes, composed of variously-shaped cells, with interstitial, generally triangular spaces. These cells contain a variable number of green globules.

The organisation of the leaves of the emerged species is the same, but the number of tubes, each of which has a vascular fascicle as in *E. setaceum,* somewhat nearer the upper cutis. The lateral tubes in these terminate at various points, a few only being prolonged to the summit, will necessarily vary with the breadth of the leaf. Thus in *E. Wallichianum,* these amount to 18 or 20, in *E. acanthocephalum,* to 6 or 8. In the former species, and in some others, each tube is partially subdivided by an incomplete septum, generally attached to the upper cutis, occasionally apparently to neither, and containing a vascular fascicle. The longitudinal dissepiments form the nervures, by their attachment to the cutis. The nervures are always somewhat depressed ; The arrangement of the vesicles is, with exceptions of *E. acanthocephalum,* and *E. glaucescens,* less symmetrical than that of *E. setaceum.* In these too, the vesicles are attached to both cutes, but chiefly to the upper, and to the transverse septa, and vary much in form.

The under surface of the leaves of all the species I have examined, abounds with stomata, and as these exist also on the sheaths and peduncles, I shall defer the account of them until the two last named appendages have been noticed.

Sheaths. These have precisely the same organisation in all ; not excepting *E. setaceum,* the sheath of which has generally about 10 tubes.

The tubes terminate in *cul-de-sacs,* at a variable distance from the ends of the sheaths, which are membranous. The same arrangement of the parenchyma, and the same structure of longitudinal and the transverse septa occur. Their outer surface which obviously corresponds with the under of the leaves, abounds in stomata. The number of tubes appears to have some relation with that of the peduncle

particularly where this is quinarily divided. Thus in *E. setaceum*, the tubes are generally in the following ratio. Sheath 10, peduncle 5.

In *E. acanthocephalum* the same occurs, In *E. glaucum*. sheath 11-12, peduncle 5-6, *E. Wallichianum* presents no correspondence, the number of tubes of the sheaths being about 16 or 18, of the peduncle 5-7. There does not appear to be any fixed correspondence, as might be expected between the tubes of the sheaths, and leaves.

Peduncles. These are marked externally with whitish lines, running in a spiral direction, the spaces between these being green. The white lines correspond to the longitudinal septa, the green spaces to the tubes. They are cellular in the centre, and around this are arranged their vascular fascicles, which vary in number with the tubes. This cellular part, or axis, is prolonged outwards into as many spokes as there are external white lines, which in fact are nothing but the termination of these spokes. The spokes are with perhaps the exception of *E. Wallichianum*, identified with the cuticle. The whole of this system is composed of more or less elongated cellular tissue, in *E. Wallichianum* approaching in density to woody fibre. In this too, the spokes project further beyond the tubes than those of any of the other species. With respect to the tubes they are in every respect analogous to those of the leaves and sheaths.

They terminate at the apex of the peduncle in *cul-de-sacs*, the green spaces between the terminations of the spokes abound with stomata, we have the same form of parenchyma, disposed indeed with less regularity, and the same transverse septa, except in *E. Wallichianum etc.* in which they are very incomplete. Does this depend on the denser nature of the tissue of the scapes, which is evidently opposed to rapid elongation ? ; in *E. setaceum* they are precisely the same as those of the leaves, I may observe that the development of the spokes is in an inverse ratio with that of the tubes. This

is at its maximum in *E. acanthocephalus*, in which the tubes are smaller than the spokes.

Sir W. Hooker has given a representation of the transverse section of a scape of the *E. decangulare*. Bot. Mag. New Series, t. 3126, in which I imagine the green reniform spots, are intended to represent the tubes. The central circle there represented I do not quite understand, since the connection of the spokes, (which are a continuation of the central system), with the cuticle, is in all the species I have examined, uninterrupted and most distinct.

With regard to the transverse septa, I am unaware that any opinion as to their nature and origin has been given.

M. Mirbel indeed in a note on Marchantia, appears to think that they are openings in the sides of the cells, and in particular refers to the septa of the plumule of Nelumbo, in which he says the clefts are so multiplied, that the cells are actually transformed into reticulate tissue. Examined in their perfect state, they do certainly appear to be clefts. In reality they are nothing but intercellular spaces, modified in form by the transverse distention they have undergone. That such is their origin is evident on examining the latest developed parts of the leaves of Eriocauleæ, or the peduncles of those species which have incomplete septa, we here find that the partitions are not flattened, that they are composed of vesicles of exceedingly irregular shape, containing green globules; that these cells present two, three, or several gibbosities, by means of which they are mutually united, while they are totally unconnected elsewhere. Spaces will hence necessarily exist. We have then to assume such a degree of lateral distention consequent on the increase of diameter of each tube, that the cells become flattened, and the meats generally assume an angular form. That this distention operates in this way there can be no doubt, since longitudinal distention is obstructed by the septa being attached transversely to the parietes, it can hence have only the effect of increasing the dis-

tance between the septa. It is owing to the transverse distention that the green globules lose their aggregate form, and become irregularly dispersed, they are universally present in the septa.

I have examined these septa in Alismaceæ. Pontederiæ, Cyperaceæ and Nelumboneæ, in all of which their organisation is precisely the same as that of Eriocauleæ. In the Pontederiæ, raphides are attached in abundance to these septa, and at right angles. The raphides are enclosed in colourless cells, an organisation I have met with elsewhere,* these cells have from some cause or other stuck in the meats, so that either extremity of each raphidiferous cell, projects beyond both surfaces of the septa. It may be objected that, if such is their formation, lateral distention would cause their separation along the points of junction, but their union however at these precise points, is so firm that the cells will generally tear across, sooner than separate. If they are clefts, why is their margin double ? a fact only to be explained by their being meats existing between entire cells. If more proofs were wanting, dissection demonstrates the cells to be entire.

Analogy is against the existence of clefts in cellular tissue, except perhaps in the tissue of some anthers, all exceptions are probaby capable of explanation, a marked appearance of pores occurs. In the cells of the under cutis of a species of Æschynanthus, (which is very thick), meats exist in abundance between the cells, which are multigibbous, and adhere strongly together by their gibbosities. On separating them, circular spaces are left, very much resembling pores, which correspond to their points of attachment. On examining them minutely, the membrane is found to be continuous, and frequently has granular bodies adhering to the circular spaces. I have subjoined a figure of part of the tissue of this plant.

* In Aroideæ, raphides are likewise found in the ovula, a fact known to Mr. Brown. In the integument of the seed of *Caryota urens*, they occur in vast abundance, and are of very large size.

Parenchyma. This evidently consists in all these species, and in all leaves, of green bodies, contained in distinct cells or vesicles. These cells leave strong impressions on the cuticle, to which they are attached. Besides these impressions, there are others smaller, ovate or semicircular, attached to the edges, or lines of junction of the cells, they are only visible when the cutis is observed internally. These globules are again composed of green corpuscles of unequal size. I am unable to state whether these again are contained in separate cellules. M. Mirbel states that in Marchantia the green matter is contained in spherioles, small vesicles attached to the membranes. They are broken up on the application of pressure, the vesicles then appear to be filled with an infinity of green corpuscles, spirit destroys almost entirely the green colour, the globules then appear of a dingy greenish and opaque brown. The globules on escaping into the water in which the object is immersed, appear to have a lively rotatory motion.

Stomata. I have said that these abound in the leaves of all the species, this may appear strange, since these appendage in the *E. setaceum* are always submerged on sheaths and peduncles. In all, they are visible to the naked eye, appearing like small elevated white papillæ, arranged irregularly on the green spaces of the above organs. They are of general occurrence, but of small number in the leaves of *E. setaceum,* but *their* structure is the same as those on the emerged parts, and as perfect. In all the species I have examined, they are of an oblong form, the cellules, contain, as usual, green granules, the opening being elevated above the surface. No better examples could be adduced to prove the correctness of Mr. Brongniart's statement and drawings of the nature of these bodies. They communicate directly with the interior of the leaves, sheaths, and peduncles; the passage being invariably occupied by air.

The communication is uninterrupted in the *E. setaceum* and two other species: no vesicles exist on the stomatose sur-

face, and in those in which vesicles are here disposed, this is invariably an open space left corresponding to each stoma. The fact of their existence in the submerged leaves, is I believe unparalleled.

This species is also an exception to M. Brongniart's rule that submerged leaves have no cuticle. However it is an exception that strengthens his view, since, as it has a cutis as perfectly developed as that of the emerged species, it must have stomata for the due performance of its functions. The stomata of these plants examined as opaque objects, remind one not very inaptly of the large apertures of Hepaticæ, so beautifully illustrated by the celebrated Mirbel. They may almost be considered as a link between those, and the more general and obscure form. The opening always appears green, although from its small transverse diameter, I have not been able to see the vesicle distinctly through it.

Connected with other points of their structure I may observe, that the elongated tissue of the peduncle of E. Wallichianum is minutely punctuated. The punctuations being of the same nature with those that have so long puzzled Botanists. If they are pores, as some suppose, why is their colour not the same, with that of the field in which they are viewed, and why is light (at least in the Wollaston arrangement adapted for doublets), always reflected of a light yellow tint.

Many of these cells, particularly those of the *E. setaceum*; contain numbers of green minute granules of irregular size, apparently similar to those, by the aggregation of which, the green globules are formed, these granules have a very active rotatory motion similar to that of a spinning-top, but more irregular, there is no motion whatever of ascent or descent.

5. *Eriocaulon setaceum*, Pl. CLIX.

1. Transverse section of stem.
2. Inner view of the *convex* upper surface of the leaf, with attached globules.

3. Do. of inferior surface, it has no globules, and is less convex.
4. Transverse section of the leaf, one chamber open, the other with a partition.
5. Outer view of the superior cutis.
6. Inner do. row of globules in situ.
7. Green corpuscules in situ.
8. Do. detached, shewing them to be vesicles enclosing an indefinite number of green bodies.
9. Vascular fascicle of leaf detached, the dissepiments adhering.
10. Dissepiment.
11. Transverse section peduncles and sheath.
12. Portion of the same.
13. (Pl. CLXI) Portion of peduncle, 1 tube unopened, the other divided longitudinally.
14. Dissepiment of peduncle.
15. Stomata, outer view.

XYRIDACEÆ.

The few remarks here offered on the comparative Anatomy of Xyrideæ; affords an additional and strong argument in favor of its separation as the type of a distinct order, rather than allowing it as at present [1834] to remain associated with Restiaceæ.

Cuticle. Stomata similarly organised, abound on both surfaces of the leaves and on the peduncles, their communication with the interior of the leaf is direct and most evident.

Leaves. Their whole surface between the cuticles, filled with parenchyma, this is traversed by vascular fascicles which have no connection with either cutis.

Parenchyma similarly developed; that contiguous to the

cutis, being linearly arranged, and globose, the central portion being more irregular.

The peduncles are fistular in the centre ; around this, is developed cellular tissue, cheifly of a hexangular form, on the circumference of which there is a narrow deposit of woody fibre, interspersed with vascular fascicles.

The space between this and the cuticle which is abundantly supplied with stomata, is filled with parenchyma, so dense, that the meats are very small. Towards the base, where the scapes are smallest, the centre is occupied by cellular tissue. The fistular appearance is evidently owing to the increase of diameter, and is formed partly by the rupture of the central tissue, the debris of which is often visible.

No spiral lines, and consequently no tubes ; no septa exist in the leaves, or peduncles.

The empty spaces existing in the leaf immediately opposite the openings of the stomata, are very apparent ; there is the same deficiency of spiral vessels.

Xyris.

1. *Xyris sp.* Pl. CLXI. C. *Khasyah Herb.* 495.

2. *Xyris sp.*

Axis 5-6 uncialis simplex abbreviata, fol. basi dilatatis vaginantibusque linearibus acutus sæpe tortis, scapus *radicalis*, e sinu folii ortus, sub anceps, 2-3 tortus, apice capitulum florum gerens. Bracteæ scariosæ ovales flores suffultientes, brunneæ, marginibus aureo-nitidis, nervo medio apicem versus viride, anticæ extimæ vacuæ angustiores. Bracteæ interiores 3, 2 laterales naviculares, membranaceæ, albidæ, tertia antica difformis, late obovatæ, unguiculata *cucullata*. Perianthium coloratum aureum, 3 sepala, sepalis unguibus planis distinctis, basibus limborum interdum convexa, mediantibus membranis filiformibus, apicibus dilatatis, fasciculos pilorum stuposos gerent, interjunctis. Stam. 3, epipetalo, petalis opposita, filam. breviss. limbi petalorum basi inserti. Pet. limbo. oblonga subtruncato-denticulata. Anth. bilocul. cellulosæ

longit. lateral. et extrorsim dehiscent. Pollen ovatum, hinc sulcat. Stylus brevus apice 3 fidus. Stigmata 3. papilloso-capitata, lutea. Ovarium obsoleti 3 gonum, 1 loculare, placentis latis, 3 parietalib. Ovula plurima, foramen hilo opposit.

Hab. In *arenosis siccis*, sub humidisque. *Mergue: October* 1834.

Folia marginib. denticulato-scabris, scapis subancipitibus subteretibusve: (4-6 uncialib.) foliis linearib. acutis, subeveniis marginibus denticulato-scabris, capitulis subglobosis, squamis apicibus carinat. nervo medio nempe prominulo discoloreque *X. scabræ* affinis excharactere Br. Pr.

PISTIACEÆ.

PISTIA.

Pistia stratiotes. Pl. CLXI.B.

This plant consists of a depressed shortened axis, of a somewhat bulbiform shape. Inferiorly this gives origin to the roots, which at first, and until they have reached some length, are simple; they then become verrucose, each protuberance marking the exit of a radical fibre. The adult roots are very much branched, especially towards their bases, the apex of each radical fibre is enclosed in a membranous brownish sheath. The *leaves* do not appear to have any definite order, they are almost sessile cuneiform obovate, subrepand slightly emarginate, entire, 5 veined. The *veins* are not very minutely subdivided: they are prominent on both surfaces, particularly the under one. The middle vein alone reaches the point of the leaf, its termination is indicated by a brown spot, to this point the lateral veins converge. Both sides of the leaf are equally clothed with white, nearly erect, very abundant jointed pubescence. The axillæ of the leaves give origin to the inflorescence: the lower angle of their origin from the stem in the lower leaves, sends out roots. The *inflorescence* is axillary, spathaceous, pedunculated. The

spadix consists of a short peduncle, which soon expands into a membrano-cellular spatha: the margin of which is contracted towards the middle, it then expands again, and assumes an auriculiform shape, margin repand apex acute. From the base of the expansion proceeds the ovarium, and corresponding to the contracted portion or base of the auricula, the male flower. Intermediately and close to the male flower, a glandular subcyathiform repando-crenate body is produced. The male inflorescence consists of a glandular lobed crenate sessile cup, from the centre of which a column arises bearing towards its apex 3-4 anthers, one being terminal. Anthers 4 lobed, lobes reniform, pollen smooth. The ovarium, which is attached extensively and obliquely to the middle part of the spatha is ovate globose (when nearly mature) 1-celled, containing several half ascending ovula. Placenta of equal extent with the attachment of the ovarium, the style is short, stigma subcapitate, papillose. The ovarium is easily ruptured, its endocarpial cells contain air, a few veins are visible but do not seem to ramify it, as well as the ovula contain much mucilage.

The ovula are in their early stages smooth, ovate narrowed towards the centre, externally the secundine is at this time highly developed, projecting considerably from the opening of the primine. The testa subsequently becomes verrucose: the apex of the seed is concave, and at the bottom of the concavity the embryo is situated. Embryo solid, situated like a wedge at the apex of fleshy albumen.

From among the leaves, offsets branch off, from the axis, which after running about an inch, enlarge at the apex, which becomes a shortened depressed axis, and developes leaves etc. in the same way as the parent axis.

The *Ovarium*, as it increases in size, becomes more and more inflated, it is always backed by the spatha, which remains tolerably perfect, it is terminated by the remains of the style.

The stem of the offset, consists of cellular tissue irregularly broken up into large cavities for containing air ?, and a

double series of vascular fascicles, one of which is external, the other internal, there is no central cavity.

The air cavities continue to the base of the *new axis*, they there terminate abruptly. The vascular bundles contain no spiral vessels, but simply ducts. The axis is composed of a dense aggregation of small cellules, its whole structure is much more dense than that of any other part. It contains a considerable quantity of spiral vessels, simple and of small diameter, some of these continue their course along the axis, others branch off and supply the leaves etc. Raphides are very abundant, their form presents nothing peculiar. The *roots* present on a transverse section a central dense mass composed of cellular tissue and ducts of ordinary appearance immediately surrounding this, is cellular tissue, from which compound cells radiate towards the circumference : these compound cells are separated from each other by partitions of cells arranged in a single series. Between these and the cuticle, tolerably lax cellular tissue occurs, the radical fibres originate from the central and vascular fascicle, they cross through the compound cells and then pierce the cuticle, part of which they carry with them in the form of the sheath. At their exit there is a distinct rupture of the cuticle. The radical fibres appear never to lose their sheaths, their structure is the same as that of the roots from which they originate.

The superior surface of the leaves is green, the inferior white, both are equally pubescent, the cellular substance of the leaf is divided into a great number of air cavities, which approach much nearer to the cuticle of the inferior surface than to that of the superior. Between these and the upper cuticle, are layer of small viridised cells. Towards the petiole, the only space unoccupied by air cells, is that between the veins; this is filled up with cellular tissue, and generally, one or two vascular fascicles intervene between the fascicle near the upper surface, and that near the under surface. If however a section be made of the more expanded

portion of the leaf, the fascicles nearest the upper and under surfaces will be generally found completely separated by the development of air cells; these fascicles are composed of lax woody fibre, or rather a striated mucilaginous mass of spiral vessels, corresponding to those of the axis, and occasionally, distinctly annular ones. I have found no stomata, the pubescence is articulate, the cell at the base appears annuliform and larger than the rest.

Pistia stratiotes, Pl. CLXI.A.

a. Longitudinal section of the ovarium.

b. Longitudinal section of perfect ovule. 1 fungous testa, 2 albumen, 3 embryo.

c. Long section of ovarium.

h. Ovule; *e* longitudinal section of ditto: *i* vertical view of the apex ditto: *f*. longitudinal section of the ovule, at a very early stage.

d. Long section of ovarium.

j. Embryo.

k. Long section of spath, 4 column of stamens removed.

l. Male flower, *n* bracts, *o* front of anther; *p* membrane of the anther; *r* pollen.

m. Spath.

q. Male flower long section.

The same continued, Pl. CLXI.B. Fig. 1.

a. Transverse section of stem, *k* cells forming the walls of the air cavities, *l* ducts of central fascicles.

f. Annular vessel surrounded by dense woody fibre; *d*, transverse of radical fibre.

g. Transverse section of stem an offset.

i. Ditto of leaf.

h. Ditto of petiole.

j. Radicle, *b* long section of radicle.

e. Cellular tissue adjoining the air cavity.

c. Cuticle.

AROIDEÆ.

General remarks.

Houttuynia cordata. In the Suddyah plant each flower is subtended by a minute white scale. These scales are in the four lowest flowers much developed, and petaloid; forming indeed the 4 valved spathe, and pointing out very plainly the origin of spaths generally. There is some difficulty in referring this plant to any sexual class, and the character of the genus still requires remodelling. Three stamina are almost universal except in the terminal flower, the ovarium of which is surrounded by many stamina, 5 of which generally separate with the ovary, but as the remainder are intermixed with squamiform bracteæ, it is natural to suppose that they represent several partly abortive male flowers. Thus, it is at once seen, that if we look to the terminal flowers alone, we must refer Houttuyniæ either to Monœcia or Polyandria. I should say to the former.

The third carpellary leaf is invariably situated posticously, or next the axis, and its stamen (speaking with reference to the hermaphrodite flowers) is invariably adherent to a greater extent than the two lateral ones. The bases of all are persistent, the remainder rapidly sphacelating even before the anther has performed its functions, and subsequently falling off. The ovula are antitropous, the stigmata appear deciduous (or rather the stigmatiferous portions of the styles), the micropyle is very conspicuous and is pointed out by a papilla. The integument is double, the outer one reticulate crustaceous, the inner white, very fine membrano-cellular. The embryo is inverse, and lodged in the extremity of the albumen remote from the hilum: not near the umbilicus.

HOUTTUYNIA.

Char. Gen. Spatha 4 valvis. Flores bractea suffulti! plurimi inferioresque sumusque hermaphroditi, apicales intermedii

masculi. Stam. 3, basi cum pistillo cohærentia, vel epigyna. Styli 3. Stigmata totidem. Capsula 1 locularis oligosperma. Semina reticulata. Embryo minutus in apice lbuminis locatus.

This decided tendency to unisexuality is of importance, as otherwise it would tend to weaken the distinction between Acoroideæ, and Aroideæ. And here it may be asked, are not all naked flowers unisexual ?. Of Achlamydeous Orders, including both Dicotyledons and Monocotyledons, there are 18, out of which 4 are described as hermaphrodite; the proportion thence being 1 to 4½, so that we have analogy in favour of our supposition. If, as I imagine we can, deduce any thing favourable from the situation of the stamina, we find that out of the four usually described as hermaphrodite, one (Cloranthеæ) has the stamina constantly unilateral, and two, Piperaceæ, and Podostemeæ, (the former certainly simple by abortion), have them most frequently so, hence there only remains one, Saurureæ, from which nothing favourable to the above view can be deduced.

In the anatomy of its stem, Houttuynia is decidedly Dicotyledonous, and with the exception of an adhesion of the bark* ? to the ligneous system.† The central cellular portion, or pith is very large, and the cells are loaded with amylaceous granules; around the circumference of this, is situated the woody system, which consists of two parts, the inner system, consisting sometimes of distinct fascicles, composed of vessels surrounded by punctated woody fibres, the innermost of which are spiral: the outer system is continuous, and composed of punctated woody fibre alone. The bark is rather thick, and is provided with a distinct cutis.

The stomata present no peculiarity. The venation of the leaves is Dicotyledonous, as is likewise their aspect.

* Or outer thick cellular integument, the cells of which are loaded with a pink fluid.

† Such adhesion is not uncommon in herbaceous dicotyledons.

The pollen is apparently perfected at a very early period, and as it always consists of very unequal grains, which indeed present every gradation of size, we may conclude that it is formed by the augmentation of an originally simple granule, not as is perhaps generally the case, by the 3-nary, or 4-nary division of an originally simple grain. The cells of the endothecum next the connectivum, are the only ones that are marked with incomplete fibres, perpendicularly disposed to the endothecum, and with a tendency to connivens. The cells themselves are globular.

The ovula have 3 coats, two of which are permanent, the inner one being in the seed, excessively thin. The albumen is formed within the nucleus, which is an exception to my albuminary sac; (it remains to be shewn however, whether the nucleus is not itself always a membraneous sac.) and at its apex, and within a saccule attached originally to the apex of the nucleus, is developed, the embryo. If this saccule is in the fully ripe seed to be detected, Houttuynia must be referred to Saurureæ.

Arum colocasia, and A. *fornicatum* of Roxburgh, are *Caladia*, which is distinguished from Arum by habit, by a tendency to trilocularity of the ovarium, its well developed stigmata, *pluri ovula*, and by the anthers, which are plurilocular? In *Caladium* and *Colocasia*, the anthers often preserve the typical form, and are only bilocularly 4 locular, in other cases they are 6 locular, they open only by their upper part.

Abortive ovaries of varied form occur among the developed ones, in the upper portion these pass obviously into the central glands, as do the upper ones of these into the stamina.

In C. *fornicatum*, the style is a good deal, and the stigmata are much developed.

Glands scarcely occur mixed with the ovaries, the lower ones are of very irregular form, the others so closely locked as to give the spadix here a mere reticulated appearance, the

upper ones pass insensibly almost into anthers, these are plurilocular and the cells are either approximated in pairs or single.

In *Calla aromatica*, the organisation is a good deal different. In the first place we have the spatha of Pothos, for there is no greater degree of involution or of development at its base than else where.

We have the tendency to tricarpellarity, and what is very remarkable in the order is the *suffultion* of each ovary by a bract, which takes on the appearance of a gland, or rather abortive anther, but is very regular in its situation.

The anthers again approximate much to those of Pothinæ, having a distinct flattened membranous brown filament, which adheres to the spadix, and a bilocular typical extrorse anther, they are almost always aggregated in threes, the third being in such cases the lower.

In the venation of leaves it approaches Pothos, which is much more Monocotyledonous than *Caladium* or *Arum*. *Calla* is itself truely Monocotyledonous in this respect.

Another singular thing is the fasciculate, or aggregate inflorescence in one axilla, and the decidedly terebinthenous odour, from which I would infer the presence of Coniferous, or rather resiniferous, glands or dots.

The ovula in their number and form are much more typical, and approach again to Pothos, the foramen being near the hilum.

Does it not present another affinity to Pothos, by the sheaths of the peduncles of the spathes. Philodendron passes into Pothos directly by its habit.

In *Caladium Colocasia*, each young leaf is enveloped in a simple sheath, which is not, besides, strictly axillary. The venation is conducted on the same principles, but the outer lamina after having made the complete circuit, is inflected for a short distance between the midrib and itself; see Fig. II*a*,. Pl. CLXXIII. This inflexion however only takes place near base of the leaf.

The lobes have a curious vernation on similar principles, one may be regarded as external, its lamina involving the other, though not completely; Pl. CLXXIII. Fig. II. *a* inner, *b*, *b*, *b*, outer.

The inner is involved on itself, and is much shorter, ceasing opposite the shorter one of the other lobe; this shorter one is its inner, the outer being much larger, becoming involuted; within this, and passing round first between it and the outer limb of the outer lobe; subsequently the peduncle has a similar leafy sheath.

In *Caladium fornicatum* it is really leafy at last, although as usual it is membranous at first.

Have Aroideæ unilocular or bilocular anthers? On this point, much will depend on the composition of the multilocular anthers, as if the cells are always in pairs, they are bilocular; but in which ever light we look upon them, all those which have more than 4 cells to an anther, are evidently not monandrous in the strict sense of the word, for although we have evidence of anthers being many celled, yet in all these the formation is evidently bilocular, this is indicated by the formation of the anther in *Viscum*, and by the two pores in *Rafflesia*. Besides, in both these, the cells are irregular, and indefinite in number. See also *Rhizophora*.

The types of formation dependent on the situation of the anthers. Are typical, really hypogynous, or are they dislocated and placed higher up than the female flowers, are there glands or not intervening, of which it may be said, that the lower represent abortive ovaria, the upper abortive stamina, at least in *Arum flagelliforum*.

Calla Aromatica, in which the fertile stamens are dislocated, is intermediate between these two distinct forms, but there is an abortive stamen attached to the base of each ovary. I consider this an abortive stamen, rather than a slightly developed bract, from its appearance, its want of vascularity and

its being attached to the ovary a little above its base; if this is true we shall find species with three abortive stamina, and the three ovaria.

Acorus may be explained on the same principle as equitant leaves, as the plant has equitant leaves, it is bound by law to have the spatha similarly organised.

Pistia will approach to genuine *Aroideæ* which have the base of the spatha of more permanent texture, and to*Ambrosinia* in particular, in the two partitions of its spatha. It agrees with them in being Monadelphous, but not in its anthers, which are not adnate, as those are, although they open in the same way in the presence of intermediate glands, and would seem to point out, that to each flower of each sex, there should be some corresponding body.

The involutivo-convolute æstivation is the typical form in *Aroidiæ*, and is at its maximum in *Cryptocoryne*, in which it is curiously modified, for while one lamina is highly involute(Pl. CLXXIII. Fig. II., 1*a* midrib, b outer lamina) the other passes over it, and terminates opposite to its origin, from the thick cellular cavitated midrib, at the very base of the lamina (Pl. CLXXIII. Fig. II. 3.) both are equal, but there is a tendency to one becoming internal, on which the subsequent modification depends (Pl. CLXXIII. Fig II. 2.)

The venation is, as it were, intermediate, the primary veins being Monocotyledonous. The secondary being obliquely transverse, it is much more Monocot. than Dicotyledonous. There are traces of pellucid glands of a linear oblong figure. Each new leaf is embraced by two alternate sheaths, of which the lower is opposite to the next lowest leaf but one; the upper opposite to the next leaf, nothing is developed from the axils of these sheaths.

What are they ?, are they analogous the ligula of grasses, differing only in being in themselves distinct ? The situation is against their being bud scales, for they appear to be truly opposite to their respective leaves. These require further examination.

The situation of the carpellum in Ambrosinia reverts to the usual type, so much so, that after the falling away of the antheriferous portion of the spadix, and particularly in the ripe fruits, there is but little to indicate that such had been its original structure. This inflorescence is hence some what analogous to instances such as *Ericornis*, *Ananas* etc. in which however the prolonged axis bears typical leaves. The structure of the seeds is highly curious, and unlike that of any others. I have explained it elsewhere.

The passage to this structure is in to *Dracontium*, in which (as it belongs to the typical form of the order,) we may expect it to be less in degree.

The fragrant matter of *Calla*, which has the peculiar resinous smell, is lodged in large cellular sacs, scattered apparently without order in the Rhizoma, and are perhaps independent of vessels, they are easily separable ; besides there is a general diffusion of the fragrance, but in the petioles there are no reservoirs. The vernation is the same as in *Ambrosinia* but the outer lamina is carried twice round the leaf. Stomata are found on both surfaces, but they are most numerous on under.

Cryptocoryne.

1. *Cryptocoryne elata*. Gr Pl. CLXX.

Spatha axillaris, breviter pedunculata tubo dodrantale alba compressa, marginibus involutis, basi versus connatis, Limbo patente explanato conduplicato recurvo, 1-torto, tri-sulcato, sanguineo purpureo margine processibus carnosis subulatis simplicibus, divisive fimbriat. fauce annulo obsoleto, obliquo notat. ochroleucescens punctis purpureo-brunneis.

At the place where the margins are quite connate, one is rolled up into a hollow cone, and in this the head of the spadix is contained.

Spadix ratione spathæ minute, sinu basi simplici serie fæmi-

nei accedit, stipes graciles filiformes, vasculosa, tunc pars subclavato antherigere, denique apex imus spatheis conicus nudiss. texturæ partes intermediæ.

Ovaria (ut in Pistia) dorso spadice fere per totam longitud. adnat. Stylo sub o. Stigma subsessilis oblongo-discoidea papillosa. Ovula plura cuique ovario, antitropa, funiculata, filamentis, simplicibus vermiciformibus crebris quasi nidulantia.

Antheræ biloculares, raro 1-3 loculares pyxidiformi, apice lati dehiscentes.

Pollen tubes often imbedded in the anther itself.

Fructus nudus. Spatha nempe lapsa spadicis vestigius nullis, e carpellis 8, ventro planis, lateribus sub-bicarinatis, connatis, apice recurvis centrale sulcatis conflatis.

Rhizomat. fol. florifer. brev. Petioli altiuscul. vaginant. 3 pedales apici canaliculati cæterum teretes; lamina anguste et longe lanceolata, subacuta, carnoso-coriacea, integra, venis 2 indistincti, obliquis. Spatha petiol. 2-3 brevior axillaris lamina obliq. ascendent., tubo compresso.

Æstivat. involuto-convolut., vagina marginibus involutis mag. folium quodque initio vestit. Processus ciliiformibus *axillaribus* (from the whole axil. not from central point), pluribus.

Spathæ limbus æstivatione 1-tortus compressus angulatus marginales valvatim incurvatæ, æquales, but in the tube one margin is thicker, and the two are valvately applied, with a tendency to incurvation. It is from the thicker margin that the hollow cone has its origin. This plant is remarkable for the process of the spatha covering the apex of the spadix, for the pyxidate anthers, the direction of the females, and their broad attachment, the vermiform conducting tissue, the imitation of a compound fruit, and above all, for the embryo.

1. Plant about the natural size.
2. Lamina of leaf.
3. Lateral view of inflorescence.
4 Front do.

5. Spathæ in æstivation, *a* is the line along which it will open.
5*a*. Shews æstivation of lamina of spatha.
5*b*. Æstivat. of spatha, about the faux.
5*c*. Ditto of the tube.
6 Long section of base of spatha, but not of spadix, shewing hollow conical shaped process.
7. Another section parallel to, and through dorsum of spadix, shews that this arises from the thickest margin.
8. Another spadix removed.
9. Spadix, spatha removed.
10. Two anthers these generally will be found to exsert a cone of mucilage, in which the grains of pollen are imbedded, these are represented also as emitting boyaux.
11. Perfect pollen grain.
12. Young grains just escaping from parent cell, from the same anthers equally developed.
13. Young grain, 14 more developed.
15. Long section of the ovarial part of the spadix.
16. Ovulum and filament.
17. Ovule structure of.
18. Vermiform filament, doubtless *conducting*.

2. *Crytocoryne elata, fruit and ripe seeds,* Pl. CLXXI. Fig. II.

1. Fruit not of full size.
2. Ditto full size and open; *a* remains of the winged axis; *b, b, b, b.* portions of the white membrano-cellular septa.
3. Seed.
4. Same longit. section ; *a* testa, *b* callous urceolar nucleus. *c.* cotyledon, *d* inner (accessory) radicle, *e* axis from which the plumula and young leaves originate.

5, 5. Two seeds from the same, both germinating in the fruit.

6. Same long section, *a* hilum, *b* testa, *c* callous urceolar nucleus, *d* cotyledon, *e* primary radicle, *f* axis.

7. same subspontaneously separated from the cotyledon, nucleus, and testa; *a* cicatrix of cotyledon; *b* primary radicle.

8. Same: vertical of lower face, or base: *a* cicatrix of cotyledon; *b* primary radicle.

9. one of the young leaves shewing its convoluto-involute vernation.

3. *Cryptocoryne elata.* Pl. CLXXI. Fig. I.

Represents the stages of development after the protrusion of the radicle and appearance of plumula.

1. Young fruit.
2. Young abortive ovule, (after fecundation)
3. Do. long section.
4. Do. nucleus, and inner tegument?
5. Apex of do. represents what I thought I saw of the boyau and its penetration, all the above were from the same fruit, no. 1, from which all remaining figures likewise were taken.
6. Young seed.
7. Same, most of the spongy testa removed, the radicle projects from the nucleus, and the plumula is developing, *a* foramen with callous edges.
8. Same, nucleus cut away at the base, shews the extent of the cotyledon and the loose tissue lining the nucleus.
9. Nucleus of same. Embryo removed.
10. Embryo.
11. Apex of nucleus projecting, radicle and plumula seen laterally.
12. Do. in front.
13. Do. dorsum or radical face.
14. More developed seed, long section.
15. Same: upper half of testa removed.
16. Embryo viewed on its radical face.
17. Head of Embryo viewed on its face opposite the radicle.

4. *Cryptocoryne* (*Eusiphonia*) *cordata* Gr. Pl. CLXXII.

Pedunculus axillaris, *solitarius* singulus 2-3 uncialis.

Spatha dodrantalis, tuba membranacea, venosa angusta, subcylindracea, marginibus apicem versus excipe coalitis.

Lamina, caudata oblique ascendentia, caudato-acuminata marginibus revolutis, simplicibus, colore ut videtur purpurascenti-viridis, tubo ad apicem *spadicis brevis*, processu ½ *hollow cone-shaped*, venoso ! membranaceo. Spadix basi feminea, supra femina, organa neutra medio gracilis nudissim. apice oblonga, clavata, antherigera.

Ovarii axi adnati, 6-8 unilocular. ovula plura filis tenuibus nidulant. angulo interna affixa anatropa. Styli tot quot ovarii robusto ascendentes patentes. Stigmata terminalibus discoid. oblonga. Corpusculæ late clavatæ, uniseriatæ, ovaria supra pedunculi partes nudæ basin ambiunt. Antheræ bi-pyxidatæ sessiles, processus terminalis: explanate subfoliacea venosa, acuminata ⅛ brevior quam pars antherifera.

Herba immersa spathæ apice excepto. Caule simplici basi radicans. Foliis pluribus longe petiolatis, petiolis basi vaginatis lamina cordato-ovata. Inflorescente foliis summis paullo longior.

Omnia Cryptocoryna, nisi tuba spathæ : ad laminam fere marginibus coalitis. Processus pileans ½ *hollow cone-shaped*, membranaceo-venosus. Laminæ margines simplices. Processus supra ovar. neutrii. Ovaria stylis prædita et apice spadicis explanata.

Forma verisimiliter subgenerica, quibus habitu etiam differt et statione *C. veræ* nempe incolæ littorum inundatorum limosorum, hac peninsula in colæ aquarum stagnatarum.

1. Plant half size.

2. Base of spatha laid open.

3. Transverse of spatha, about the centre shewing it to be connate.

4. Spadix and long section of the front ovaria.

5. Anther.

6. Ovulum immersed in the hairs.

5. *Cryptocoryne sp.*

Planta demissa. Rhizomate vel caulis, distanter annulato. Petioli subspithamæi basi. 2-3 vaginantes, cito teretifacti, folia cordata basi reniformia, plus minus repanda of a thick fleshy coriaceous texture, obtuse emarginate veins indistinct; above bright green; subtus purpurascent. papillis vel punctis (Stomata?) Ad basin cujusque novelli stipulæ membranaceæ magnæ erectæ binæ. Pedunculus axillaris brevis.

Spatha biuncialis, uncinata extrorsum, linea junctionis sulcata, lamina sublanceolata patentia, caudato-cuspidata, papillosa, an oblique smooth part at the faux, initio livido sanguineo demum atrascens, textura coriacea.

From the base of the convolution internally, descends a large, dimidiate *hollow cone*, totally inclosing the antheriferous part of the spadix.

Ovaria 6, arcte coalita verticalia. Styli totidem robusto-breves *patentes*. Stigmata 6, oblonga, discoidea, foveolata or depressed in the centre, 1-celled with a few subbiseriate antitropous ovula, towards the base surrounded by cellular hairs.

Space round base of the naked attenuated filiform part of the spadix rather flat, occupied by the lobed yellowish papillose bodies in number 6, alternating with ovaria. The filiform part of spadix is about 4 lines long.

Anthers of two cells placed vertically, and rather crowded towards the top of the spadix, which is prolonged beyond them into a fleshy subconical peak.

Peduncle of naked fruit, not elongated, fruit ovate, conical, as many lobes as carpella, rugose, reddish out side, styles apices recurved, rather elongated at the apex, stigmatigerous.

Seeds few, refracted from base, stoutly subulate.

Testa tinged with dense flesh coloured, cellular Albumen?

Embryo axile, not reaching into the curvature of the base of the seed, radicle superior, not thickened. Plumula large, exserted, passing down in the axis of the seed, of two un-

equal subulate leaves. Native names *Verupha, Alloor Gojah.*

Obs. The remarkable points of Ambrosinea are the septum of the spatha, the vertical ovaria, and the development of the ovulum.

Of this portion of the subject, the chief points are the non-correspondence in growth between the nucleus and testa, the induration or callosity, the perforation of its apex by the radicle, the obliquity of this, the structure of the plumula; and the ampulation of the cotyledon.

This last, however remarkable it may be in the fruit, and even before the rupture of the testa, is so far explainable as it happens after the commencement of the development of the young leaves, which is to be taken probably, as the date of the commencement of germination. But the protrusion of the radicle from the apex of the nucleus long before this process has commenced, its immediately taking on a tendency to a downwards direction, and the development of the plumula outside those coats in which, in accordance with generalaties, it should be developed, are singular anomalics.

[When the fruit has attained a large size, the ovula are comparatively unchanged, they are urceolate, the base of the testa having become nearly globular, this tegument is crowded and its surface rendered irregular by fascicles of raphides.

I see now only one tegument, but it looks like a secundine, with a nucleus incorporated in it, the centre of this is occupied by a sub-hour glass cavity, and in its apex is distinguishable a grumous mass.

Pressure does not demonstrate any lining membrane, but it causes the escape of the grumous mass, and of the fluid contents. The ovules at this period are a good deal imbedded in hairs, these seem to retain their original appearance.

A magnifying power of 1-250 shews a mebranous tube, perhaps traceable throughout the neck of the nucleus, at its wider

part, expanding into a sac. In those carpella in which ovula are not abortive, we find them of an oboval shape, of considerable size.

The testa now is spongy, very thick above, below, forming only a thin covering to the round base of the nucleus, which is much less altered in shape, the foramen of the testa is very distinct, and callous.

There are two other points connected with this plant fitted for enquiry.

1. How is such a fruit to be distinguished from a really syncarpus one ?.

2. Is the primary radicle of Monocot's generally rudimentary and abortive ?. The only way to settle the first, is by the existence of axile vessels, but then if we were to conceive a dioiceus plant in which no prolongation of the spadix beyond the ovaria took place, I doubt whether there would be vessels inside the placental vessels. In reference to this point, such fruits ought to be observed as have one dehiscense on the axis remaining isolated in the centre.

But compared with other Aroideæ, such as Aglaonema, the separation and exhaustion of the cotyledon in fruit, is not a little remarkable, for in Aglaonema, the cotyledon, which is very large, is perfectly fresh, aud juicy, and when the first true leaf is a span long, aad even when it is ½ foot long, and radicles are plentiful, its nutritious male apex is only absorbed about ⅓ of the distance. In this, the primary radicle is hardly ever developed.

If the embryo is not developed, the nucleus remains atteenuatedly conical, if it is developed, its apex becomes enlarged ; and the whole figure is irregularly hour glass-shaped, and the axis rectilinear. The embryo undergoes its first changes of mere enlargement in the apex of the nucleus, but whether from the constriction below this, and the hardness of the nucleus, or a certain degree of obliquity which the embryo assumes before its apex protrudes, it does not extend

below the swollen apiculous part, until its head is exserted, and the plumule has commenced its development.

But nothing can shew clearer that its protrusion is not the consequence of resistance opposed to it, than this, namely that it commences elongating downwards directly that resistance is counteracted, and until the cotyledon reaches the fundus of the nucleus, it continues to enlarge downwards, quicker than the plumule does upwards.

Pl. CLXXIII. Fig. III. *c, d, e.* Represents the embryo of a monster, *c* radicle, *d* plumula, *e* cotyledon.

The changes that occur as the seeds advance, consist in an enormous disproportion between the plumule and cotyledon, so that the fact is at once pointed out, that the development of the plumule constitutes germination, which is always attended by the enlargement of that organ, and the absorption of the cotyledon. So that the great anomaly of a cotyledon becoming ampullated, in a measure disappears. Accordingly we find that the tissue of the nucleus becomes free from fecula.

In this Malacca species nothing can be plainer than the germination inter pericarp et testa.

For in the fruit at the time of dehiscence, the cotyledon will be found to separate, the axis is an immensely large fleshy cone, producing from the whole surface the subulate leaves of the plumule, the innermost being distinctly leaves in form, vernation, etc.

The testa ruptured. At this period the testa has lost all its spongy matter, and is a fine membrane, it separates with the proportionally small urceolate nucleus and cotyledon. And is erect, not that the perforation of the nucleus takes place before the cotyledon has assumed its mature organisation. I should be inclined to refer the whole of the phenomena to a very early, and included germination.

The embryo has now an obliquely exserted apex, as seen in the right hand figure III. Pl. CLXXIII; this is of the usual

appearance, the included part is laxly cellular, and by transmitted light, is not very much like embryonic tissue, the cavity of the nucleus is complete, then lined with irregular tissue; at the fundus is a loose mass of similar cellular tissue. *a*, adherent, *b*, does not appear to be an independent body.]

Arum.

1. *Arum angulatum.*

Planta pusilla spithamæa. Tuber the size of a marble, sending off roots from above. Petioli basi vaginantes, cæterum canaliculato-convexi. Fol. hastata oblonga, venis intro-marginalibus conspicuis. Spadix axillaris, petiolis brevior. Spatha, lamina lineari-petaloideo-membranacea, tortilis, digitatis, marcescens, basi convoluto, folia ovato-angulata.

Spadicis apex sterilis subulatus perlongus spithamæus nutans.

Stam. pauca bilocular. mucronata gibbosa congesta.

Stamina sterilia decurva, bifida, alba, tunc corpora horizontalia spathulata truncata alba apice viride-purpurea sanguinea, both distant.

Ovarii basilarii congesti minuti. Stylus sub o. Stigma discoidea, l-locular. ovula 1, antitropa, ascendens, transversis; or funicle rather long, curved downwards. *Malacca*: *June* 1842.

2. *Arum viviparum*, Pl. CLXIV. Fig. II.

A. Seed with its paleaceous envelopes.

B. Ditto. Envelopes removed, the brown spots represent their lacerated bases.

C. Ditto long section. 1 tegument, 2 fleshy albumen, 3 longitudinal and central darkish line, ceasing before it reaches the apex, 4 conoid cap cut through, 7. 7 outer cap detached, 8 Embryo, 9 attachment of the inner cap; 10 cap, the palea removed, 11 vertical view of *Embryo*, the caps removed.

3. *Arum*, sp. Pl. CLXIV. Fig. I.

Caulis sordide viridescens. Petiolus Pedunculusque pallide viridiscentes. Bractea basis peduncul. albid. Fol. subtus albido-glauca, supra saturate-viridia, v. intro-marginalis distincta Spatha luteo-viridis, intus a medio infra fusco-purpur. marginibus exceptis. Antheræ albidæ. Ovaria luteo viridia. Spatha demum fusca.

Hab. *Burmah*. In umbrosis humidis prope *Namtuseek*: *March* 17*th*, 1837.

4. *Arum flagelliferum*. Pedalis; tuberes parvi, marmoris magnitud. Petiolis, limbo conduplicatis, lineare, basi sagittat. lobo. conduplicatis æquantis. Spadix axillaris (*e centro*) petiolis duplo fere brevior, spathæ basi viridæ, venis carinulatis lamina fuscescens in caudam longissimam gradato-acuminatam, ore sub-contracto.

Ovaria plurima dense conferta ad basin spadicis, subrevoluta, vel obturbinata apice rugosule. Stylus o. Stigma obsoletum 1 loculare, ovula basi affixa ascendentia.

Glandulæ difformes, inferior in ovarium, superiorum in antheram abeuntes, illis spathulatis, apice sanguineis, obscure bilineatis, fasciculis vascularis binis indistinctis, lineis intromarginalibus: his subulatis uncinatis deorsum albis. Stam. oo, densa, paulo infra cuadam cellulosam lutescentem, inferne sulcatam, attenuatissimam, spathæ longitudine. Antheræ subsessiles biloculares, loculis didynamis; mucro albus robustus, *longitud. dehiscent.* Ovula e tegment. unico celluloso crass., cujus apex subrostratus secundinii apicem mentitur; nucleus subcylindraceus centralis. Odor suavis *Anonaceus*.

Caladium.

1. *Caladium nymphecæfolium*, Pl. CLXI.B. Fig. II.

Axis abbreviata inferne stolones radices emittent. supra foliis imbricata. Foliis longiss. petiolatis, petiolis medium infra profunde canaliculatis, amplectentibus supra medium teretibus, foliis peltatis, hastatis, repandis, mucronatis, auriculis ro-

tundatis, subtus pallidis, scapis petiolis brevioribus teretibus, petiolis amplexis. Spatho basi convoluto, apice elongato-lanceolata, convoluta medium versus tantum aperta, lutea, basi viridis; parte colorato demum decidua, parte viridi ovaria obtegento-persistente, folio abortivo scapi basin amplectanto. Spatha 1-phylla. Spadix basi ovarifera, medium glandulifera, conico superne, antherifera, apice subulato nuda. Ovarium 1 loculare. Stigma sessilie capitatum, (glandulis albis intermixtis,) placentis 3, parietalibus, ovulis subascendentibus, foramen apicem. Raphides innumeræ in parietibus ovarii. Glandulæ celluloso-carnosæ, ochroleucæ, (an anther abortient,) Stam. sessilia. Antheræ 6-8, biloculares, circa connectivum apice peltatum, sæpius 3 lobum, lobis crenulatis, dispositæ, apice cellulosa medium versus in cellulis aërem continent divisus, vasculifer fasciculis intermixtis fasciculis raphidum in cellulam inclusis cellulorum parietibus affix. et intra cellulas prominentibus.

The cells enclosing raphides are placed transversely with regard to the air cells, their middle being imbedded in these, both ends stretching out into the cell. 1, 2, 3. Ovula in different stages. 3 Ovulum before the opening of the spathe.

TYPHONIUM.

Typhonium trista. Tuber parvus, depressus, superne radiculas emittens.

Fol. 2, petiolis pedalibus basi dilatatis, vagina apice canaliculata, cæterum teretibus; lamina trilobata (subpedatim,) lobo centrali oblongo medio latiore, lateral. extrorsum obliquis, semi-cordatis, auriculis magnis, approximatis, omnibus acuminatis teneris, vena intra marginalem conspicua.

Spadix breviter pedunculata cum spatha vix spathamæa. Spatha basi ovata convoluta foliacea, lamina explanata patento-ascendentia venosa intus lurido-sanguinea, very obliquely funnel-shaped, intus papillosa.

Spadix basi feminea, tunc nuda, tunc antherifera, tunc iterum nuda immulata, demum in conum basi annulatum subulatum sanguineum longe productum.

Ovaria confertissima. Stylo o. Stigma discoidea rubro-marginata, margine fimbriatulo. Filamenta varie torta longa alba. Antheræ sessiles oblongæ discretæ biloculares, medium supra *longitudine dehiscentes*, Pollen corneum.

Ovaria unilocularia; ovula 1, antitropa funiculo mediocri-curvato: shaped themselves like a gourd. Stigma a hollow papillose funnel placed in the apex of the ovary, surrounded by a subelevated fimbriated red ring.

The pollen tubes will have an extremely short way to travel, since the foramen of the ovulum reaches to the stigma.

Malacca Nhinghull: *May*, 1842.

This is a species of *Typhonium* according to Endlicher and Schott, but there are scarcely sufficient grounds for its separation from the genus Arum, many of the characters cited by these Authors in this case, appear to me to be of subgeneric value only.

Lamina spathæ post anthesin decidua, Perianthium basis foliaceum, convolutum, apice truncato hian. Pedunculus elongatus, conspicue sulcatus. Spadicis apex nudus fistulosus.

Amorphophallus.

Amorphophallus. Radix maxima placentiforma, apice depresso-concava e superfice tota vel præsertim supra radicem exserens. Folia non visa.

Spathæ ? 3, coriaceo-scariosæ lineari-oblongæ, decumbentes inflorescentia basi cingunt.

Pedunculus 2 uncialis robustus. Spatha maxima, tubo amplo-campaniforma lamina cujus marg. unus marg. alterium involvit. maxime petaloidea carnosa, deflexa crispata: antice acuminata, tubo intus basi carnosis, papillis majusculis carneo colore omnino vestit. Ovaria dense congesta spadicis basin cingunt. rubescentia rotunda, subdepressa, bilocularia.

Stylis elongatis filiformis atro-purpureis. Stigma magnum fungoideum. sæpius ut videtur bilobum. Ovula solitaria, cellulis mucilaginis immersa, anatropa; succedunt antheræ numeros.

The ovula are very singular, (Pl. CLXXIII. Fig. IV.) the cellular white part, is probably testa, the curved clavate mammellate apex, or *stalked* part is the nucleus. I rather think the loose tissue is the funiculate conducting; the stout straight raphed base is the funicle; the inclined head of this is the ovule, and that this has 2 coats or rings, and a nucleus. (*a* right hand figure) the pore or rimule.

Antheræ magnæ biloculares, subsessiles apice rotundatæ, pressione angulatæ loculo quoque rimula transversa infra apicem dehiscen. ad centrum vertically viewed albo punctulatis, loculis bilocellatis. (Pl. CLXXIII. Fig. IV.) Pollen large yellow globose and smooth, their outer coat 3 *porous* ?* inner crowded with granules.

It is a fetid remarkable looking plant; having the Rafflesiaceous putrid nauseous odor. The anther's pale, the barren apex black purple.

Amorphophallus Blume.

A good deal like *Arum campanulatum*, but the barren apex of the spadix is of a different shape. I have only seen this after flowering.

Cyrtocladon.

Cyrtocladon sanguinolentem.

Habitus *Callæ aromaticæ*. Petioli basi vaginantes rubescentes (situated 2-3ds. up) canaliculato-alata, apice canaliculato tantum lamina lanceolata caudato-cuspidata, integra coriacea, venis secondariis arcuatis, vena intro-marginal conspicua, tantum supra medium.

Peduncula sanguinolenta basi cæterum livida aggregata, squamis immixta. Spatha omnino-convoluta basi oblonga ventricosa, cæterum subcylindracea, not forming a curved beak,

* The pores indistinct.

the base is the only persistent part, and about equal in length to the beak, *h*. Fig. I. Pl. CLXXIII.

The part of the spadix within the convolute persistent base is crowded with fruit, the beak with stamina of an acuminate form, truncate and arranged in groups as in Caladium. Fruit crowed together, berried, pink red punctulate, with a depressed apex, a discoid stigma in the centre, and sub-lobed angular sides, 3 celled, with indefinite seeds attached to the inner angle of the placenta.

Seeds enveloped partly in congealed mucus belonging to the placentæ, oblong, areolate, foveolate and with small whitish mammillæ at one end, this testa encloses a smooth coniform, fleshy body, with a similar mammilla, evidently the second integument or membrane, this is filled by fleshy albumen, from which it is scarcely separable, and by an axillary round clavate embryo, the thin end is next the mammilla. See Pl. CLXXIII. Fig. I. *a* chalaza, *b* inner membrane, *c* testa, *d* albumen, *e* embryo, *f* foramen, *g* hilum.

There is an oblong foveola (*i*) which marks the eruption of plumula.

The radicle points to the mammilla, the other end which looks even more like micropyle, is the chalaza.

This, which is the same as *Calla* of Roxburgh, is either *Homalonema* or *Aglaonema* of Endl. and Schott.

This is the second species in which the antheriferous part of the spadix is not on the same line, or plane, with the ovarigerous. The spathæ owing to the curve, have a curious appearance, not unlike the beak of the bird *Anastomus*, the lower margin of the spath, being the most prominent.

It may perhaps be a subgenus of one of the above.

Aglaonema

Aglaonemæ sp.

Pedunculus 1-2 pedalis erectus crassus.

Spatha foliacea convoluta, lamina o. hians, fructus *irre-*

gulariter aperta ob distincta. Spadix breviter stipitata basi fæminea pauca gerens, interdum uniseriata.

Acedunt antheræ abortivæ, et sine spatho ullo nudo. Pars sterilis apicatis o.

Ovaria oblonga, obsoleto-costata. Stylus sub o. Stigma maximum-discoideum centro foveolatum luteum fungiforme. 1, locularia. Ovulum unicum appenso-pendulum anatropa, foramen infer.

Anthræ steriles albæ varie lobatæ, fertiles simili modo dense congistæ, et sine ordine evidenti. subcuneatæ, loculo adnatis cellulosis, connectivo dense carnoso; viewed vertically they look as though they would open by two pores, from the cells reaching to the apex of the connectivum, the locelli are quite distinct, they therefore probably open by pores. Pl. CLXXIII. Fig. IV, *j*.

Pollen immersed lanceolate. gorged with very mobile granules.

Fructus 1-sperma, 1 seriata, but rather disturbed from want of room. Costate.

Stigmata are discoid terminal, and a good deal exposed from destruction of the spathe. Immature specimens have only been yet seen, it is certainly allied to Cryptocoryne with which in habit it is exactly similar. It appears to agree with the character of Aglaonema, except in the plurality of ovules.

Fol. vernatione involuto-convoluta. Petioli basi vaginantes apice canaliculato cæterum teretiusculo, 2-3 pedali. Lamina angusto-lanceolata, acute carnosa integerrima, costa sursum plana lata, infra convexa, venis indistinctis, secondariis obliquis inferne distinctiuscule transversis annectentibus quasi immersis.

It is so like Cryptocoryne with which it was brought to me, that I cannot distinguish the leaves of the two when mixed.

Cyrtosperma.

1. *Char. Generis.*

Spatha aperta, persistens, withered. Perianth 5-7 sepal.

Stamina, connectivo glanduloso, sulcato, *apice* loculos 2, extrorsum hiantes gerens. Ovulum 1, anatropum, ascendens. Pericarpium subbaccatum, 1 spermum. Semen curvatum reniforme marginato-cristatum, Albumen carnosum. *Embryo curvatus.*

2. *Cyrtosperma lacioides.* Gr. Pl. CLXIX.

Spatha navicularis acuminata per totam longitud. aperta, venosa carnoso-coriacea extus fusco-purpurascens, venis exceptis quæ uti pagina interior ochroleucæ oblique ascendentes, fructus shrivelled and withered. Spadix apice reflexa, varie torta, intus spathamæa breve pedunculata, spatha ⅓ brevior, sub-cylindracea, undique floribus tecta. Flores arcte conferti, sepalis 5. v. 8, cuneatis, apice depressis luridis concavis.

Stam. totidem opposita. Filamenta complanata, connectivo. paullo angustius filamento oblonga, medio-sulcata, glandulosa, apice loculos 2, erectos, apice rima extrorsa demum complete hiantes. Pollen 1 plicatum glabrum. Ovarium oblongum angulatum apice quasi annulatum. Stigma discum papillosum, intra annulatum. Placenta a large longitudinal posticous process, bearing one ovulum towards its base, cavity filled with gelatinous cellular matter in which the ovulum is imbedded. Ovulum erectum anatropum, sub-hour-glass-shaped, (Pl. CLXXIII. Fig. I.*a.*) or excepting the raphal part, exactly dumbell shaped. The apex of the inner body, which is the inner, tegument, is much dilated. The nucleus is reduced to a thin membrane, its long neck will be found in the centre of the endostome.

Fructus oblongus cylindraceus, basin spatha supra descripta stipata, lurido-tristis. Perianthio persistente lividis, elongatis alioquin immulatis. Carpella ejusdem coloris nitens, perianthium paullo superans cellulosa vix baccata, mutua pressione angulata. Semen (nucifome) reniforme, curved round an intrant process marked on the back, which

is flattened, by 3 elevated undulated crest-like lines. Tegument hard subcrustaceous. Albumen carnosum.

Embryo axilis longitudine albumenis curvatus, subclavatus, radicular end greenish marked along the convex side with a long slit, or rather line.

Habitus *Lasiæ*; foliis hastatis, pedunculis armatis, aculeis conicis subrectis.

A Lasia discrepat. spatha per totam longitud. aperta, tota persistens. Perianth. foliolorum numero, structuram. Stamina quæ valde singularia.

Placenta intrante, ovulæque anatropo. Semen embryone excepto omnino Menispermaceo. *Common in ditches, Malacca.*

As the curved seed seems uncommon, or unnoticed in Aroideæ this genus may be called *Cyrtosperma.*

Seed sub-erect broadest diameter opposite the funicle, margin curved upwards, flattened emarginate, a toothed crest added in the centre, towards the cotyledonous end, micropyle sub-funnel-shaped, very conspicous, surrounded by a more or less toothed border, its inner margin lengthened and emarginate. Sides perpendicular convex; any one would think this had originated from a campylitropous ovule.

The funicular face of the seed is posticous, the inner membrane of the seed is obsolete. I believe it covers the albumen, it certainly does line the micropyle, in the form of a thin membrane, the part doing so being no doubt the very dilated apex of the second tegument of ovule.

1. Spatha etc.
2. Spadix, spatha removed.
3. Flower viewed vertically.
4. Sepal and anther (exterior.)
5. Do. do. interior.
6. Stamen dorsum of.
7. Pollen (in water.)
8. Pistillum.
9. Do. long section.

10. Ovulum.
11. Do. long section.
12. Placenta ovulum and part of Pistillum.
13. Fruit-bearing spadix etc.
14. Some of the fruits and their perianth.
15. Perianth scale. with the ruptured stamen (rupture not universal.)
16. Long section of Pericarp. not carried through the seed, exposing the micropylar face of seed.
17. Another long section in another direction. Seed cut through along its shortest diameter.
18. Long section not carried through the seed: (this is perhaps the usual direction of the seed.)
19. Seed, detached, *a* funiclæ, *b* micropyle end.
20. Seed viewed on its narrow face *a* micropyle, *b* funicle.
21. Long section of seed, *a* testa, *b* albumen, *c* embryo, *d* its radicular end, *e* micropyle.
22. Embryo detached, the situation of the plumula lined out (but not sufficiently observed.)
23. Embryo: radicular end in front shewing the long furrow.

HOMALONEMA.

1. *Homalonema minus.* Statura robusta, sed squente minor. Caulis, decumbens brevis, undique petiolorum basibus vaginant. vestit.

Petioli 1½ pedalis, for about the length of a finger channelled and bordered, at the base vaginate, cæterum teretiuscula superne plana.

Lamina cordato-sagittata, vel cordata, basi hastato-sagittata. breviter cuspidata acuminata, subrepanda, integra, carnoso-coriacea, venis secondariis, obliquis, apicem versus arcuatis, his *hastatum* quasi refractis, interveniis venulis similibus centralibus e costa, lateralibus e venis secondariis ortis striatis. *Foiateo Funckiæ.*

Spadicis in axillis aggregatis squames coriacei immexti, florentes suberecti, fructiferi decurvato-penduli petioles plures breviorres.

To each peduncle which is round, is a spathiform sheath, fleshy cellular, reddish, bi-carinate on the back.

Spatha, foliacea convoluta, apice hians, ad epocum anthesin cymbiformis. Spadix (floriger) basi fæminea cæterum androgera.

Ovaries densely crowded, no glandular bodies interjected.

Stylus o. Stigma discoideum, triloculare. Ovula oo, anatropa. vel ½ anatropa.

Fructus non visus. Sem. immatura viridia.

Hab. *Pulo Bissar in Sylvis collinis. September*, 1842.

Has it in the younger states bodies mixed with the ovaria, I think so. ?

2. *Homalonema majus.* Habitus præcedentis (*H. minoris*) ast statura 3 plo-major.

The leaves are precisely the same, with the same venation and intra marginal vein, not noticed in the description of *H. Minus.*

The spadices have just the same direction too, the sheaths green and shorter. The aroma is also the same.

Spatha altogether rolled up, not observed at all open, (the convolutions appear to increase with the growth of the fruit.)

Each ovary is suffulted by a white-headed body, which looks much like the lower abortive stamens; they are attached by a slender stalk.

Antheræ biloculares: connectivo albo crasso truncato, loculi adnatæ. Dehiscence not observed.

Ovarium oblongum. Stylus o. Stigma discoideum triloculare. Ovula plura anatropa. Only young fruit have been seen, the spathæ of these are filled with not-an-over pleasant smelling fluid, the anthers are dissolved as it were, from the spadix, the young seeds are as in *H. Minus,* most of the ovula abortive.

Found near the summit of the highest part of *Pulo Bissar*, all in one place. *H. Minus* occurred near it; are these distinct? The spatha are less beaked in this species than in *H. Minus*. *Aroideæ Malaynæ.*

3. *Homalonema roshalum.* Petiolis 1½ pedalibus basi vaginantis, ultra medium canaliculato-marginatis, supra teretibus. Lamina 1½ pedale, coriacea atro-virida, obliqua, elongato-lanceolata, decurvata, parce sed late undulata, venis primar. infra promineis, lateral. obliquis apice leniter arcuatis. Pedunculis petiolis ⅓ brevioris, sursum paullo incrassatis, viridio-lineata. Spadix et spatha arcuata subspithamæa, spatha convolutissime apicem versus subhians, viridia carnosa, foliacea margine albo, this margin is exceedingly convolute, taking ½ of a whole turn more than usual. Spadix leviter arcuatus, basi nudus, tunc succedunt ovaria corporibus albus, globoso-capitatus immixtus, quarum infimo sine ordine evidente, superiora 1, subtus pistillum quodque. Ovaria angulato-globosa. Stylo sub o. Stigma discoideum very large of 3 or 4 sulcate depressions, gibba. summa ovarium difformia. Superne spatha breve nudiuscula. Pistilla summa ensiformia et antheræ infimæ, glandulis corporibusve pistillis immixtis consimilia tunc antheræ fertile in groups of 3-5, connectiva albo-canosa, cuneata, apicibus interdum submucronta, loculis adnatis.

Pistilla 3-4 locularia placentis in axin adnatis, ovules fixed to the margins of each placenta, numerous, hammer-shaped, the long funicle making the head of the hammer, ½ anatropa, the foramen pointing away from the place where the funnel is attached to the seed.

Such a form might arise from the increased growth of the base, and hence be connected with an antitropous ovule.

The cells of the anthers open I think, longitudinally, but these appearances are obscure. Pollen diaphanous, smooth, some thing like Naiad pollen, but with a more distinct coat. Aromata generis.

Obs. I should not be surprised if this were to break up the genus Homalonema, for according to its character, it has the ovula of Richardia.

Endlicher also draws a distinction as to the situation of the bodies among the ovaria, but all the Indian ones seem to belong as regards this point, to Richardia.

It will be worth ascertaining whether the ovules are really anatropous, or only apparently so, the want of raphe, the appearance of the funicle at its attachment, and the pointing away of the foramen from the hilum, are in favour of this.

The appearances however at a rather early period, are in favour of their being anatropous. *Aroideæ Malayanæ,* 1842.

LASIA.

Lasia, Roxburghii Gr. Pothos Lasia, Roxb.?

Fol. subpedatum, partitis vero pinnatifidis, laciniis extremis basilaribus; *extus basi nudis,* bi-divisis, cetærum divisis in pinnis oblongo-ovatis, caudato-acuminatis.

Petiolo venisque primario venisque secondariis inferne aculeis armato. The penultimate basilar lobes may also be bi-divisi. Pedunculo elongato, aculeis validis armato.

Spatha arcte convoluta, longissime 1-2 torta; 1½ pedalis, atro-purpurea, carnosa, very thick fleshy cellular with large cells in the centre; inner larger cells of yellow colour. Spadix very small, contained in the still more convolute base of the spathe, 2½ inches long, areolate from the disposition of the flowers. Each of which has a prominent disk in the centre.

Perianth of generally 4, sometimes 5, cuneate, truncate, inflexed cucullate greenish segments, each protecting a bilocular introrse anther.

Ovarium blunt angular. Styli o. Stigma discoideo-capitata with one cell, and one pendulous anatropous seed.

Obs. Lasia: Endlich. Genera; but the characters of spathe *persistent foliacea,* ovula campylitropa, are erroneous, however much they may appear to be so. I take them to be ana-

tropous, the base of the nucleus not having the same curvature as the teguments to constitute campylotropum. The want of a raphe is of no importance, indeed it may be asked, what in reality constitutes a compylitropous ovule. ? Scarcely any part of the spatha is to be found in the fruit, even when the ovaria are beginning to be muricated, only a portion of the base is left, expanded and withered.

Fruit densely crowded into an oblong areolate, prickly, muricate mass, the carpella sub-fleshy, muricate at the apex ; or exposed surface, angular and reddish where appressed, surrounded by the flattened out perianthial leaves. Seed brownish, also angular and sub-muricate, outside pendulous, adhering especially towards the attachment to the fleshy parts of the fruit. Embryo conforable, radicle ? green, superior. Cotyledon white, friable, spongy, cellular ; albumen in a gelatinous state, and copious, but disappears in the mature seed.

The parts are difficult to make out, without having seen the germination.

The anthers look much like *two* joined together, but the filament has only one central fascicle.

The nucleus looks more like a sac containing granules than its usual cellular appearance, the foramen of the second tegument appears to be separable as a disc.

The anatropalism of the ovule is more apparent after fecundation when the raphe becomes evident, and the inversion is complete : although considerable changes in form and size, have affected the two teguments, the nucleus remains much the same.

The inner surface of the spathe, more especially the spadigerous part, is covered with white punctulate dots, the magnified depressed fundus is occupied by a stoma.

PYTHONIUM.

Pythonium, sp. Pl. CLXIII. Bootan Herb. n. 896. *Panuka* : *April* 27*th,* 1838.

Accorus.

Accori sp. Pl. CLXII.

This species is found both upon the Khasiya and Sub-Himalayan ranges, its elevation varies from 2, to 4000 ft. I believe I have seen it also in upper Assam.

The genus is instructive as pointing out the true nature of the spathe of other allied plants, which in most cases is more or less coloured, as well as more or less altered in shape. In this we have it entirely resembling an ordinary leaf.

The separation of *Accorideæ* from *Aroideæ* appears to me doubtful.

The number of scales appears to vary, as well as that of the stamens, neither is the opposition of these organs very constant.

1. Alabastrum lateral view.
2. Ditto seen vertically.
3. Some scales and stamina spread out.
4. Stamina posterior, 5 ditto lateral and, 6 anterior.

7-8. Ovules from the same ovary.

9. Flower after dehiscence and fecundation, laid open.
10. Stamina anterior, just after dehiscence.
11. Ditto posterior.
12. Posterior of anther, now coriaceous.
13. Lateral ditto. 14 anterior ditto.
15. Pollen. 16 just swelling on emersion.
17. Immersed.
18. Transverse of ovary, towards upper part of cells.
19. Longit. ditto.

20, 21. Ovules, 22 ditto longitudinal section.

Tupistra.

Tupistra, Pollen of Pl. CLXI. A. 6.

Churra Pongee : *September* 30*th*, 1837.

SPARGANIUM.

1. *Sparganii* sp. Pl. CLXVI. Fig. 1.

Planta in aquosis proveniens læte viridis, capitulis, masculis lutescentibus.

Fol. carinata, basi versus striata, caulis subangulatus.

Burma: Nempeen March 19*th*, 1837.

DIPLANTHERA.

Diplanthera.? Pl. CLXI. C.

PANDANEÆ.

General Remarks.

1. *Pandaneæ* approach to Palmæ, through *Nipa*, by those species in which the pistilla are disposed in phalanges. These pistilla however cannot be considered as representing, (like those of Nipa) a simple fruit, or syncarpous pistillum, as they are in two series, and the number of neither of these is precisely definite.

In appearance there is a marked resemblance to those of Nipa, but the ventral suture is well developed, and the stigmata have more of the ordinary appearance. The phalangeal disposition is remarkable from not being accidental: it obviously indicates each phalange as constituting a distinct fruit of two series of carpells looking inwards towards their own axis, the outer series varying in number from 3 to 5, but generally 4 or 5, the inner, almost always having 2 absent.

We may therefore certainly expect to find forms in which two series may be perfectly distinct, or even increased in number, and if the plants be Monœcious, each of the partial axes, may have a male coma.

Contrasted with Palmæ, the size of the placentæ is curious, and is the more remarkable from their only producing one ovulum, and that near the base.

I have not seen any perianthial scales whatever.

The inner carpella are above the outer, so that they are not internal merely from pressure.

The germination of *Pandanus*, may be said to be more precocious than that of *Nipa*, since with the exception of 2-3 membranous, there is no transition between the petioles, elamellar, and lamellar.

The seed remains attached a considerable time to the young rhizoma, which is first thrown out, and at a distance from which, the axis seems to be formed. This rhizoma looks at first like a root, but its sheaths, and their scars, shew that it is in reality a stem.

In this structure, *i. e.* the first formation of a rhizoma, and then of the leaf-bearing axis at a distance from the seed, (the first formation being accessory and temporary,) there is a tendency to Nipa. *Pandaneæ Malaynæ.* 1842.

2. *Pandanus* (*Euphalangia*) *odoritissimus?* Pl. CLXXIV.

Trees, or shrubs often low, with scarcely any caudex or stem.

Foliis undique imbricatis, without any definite spirality, linearia subulato-acuminatissime, carinata, margine spinis subulatis albis subcurvatis, ascendentibus, validis armato, carina spinis similibus uncinato-decurvis; cauda vel subula triquetra aculeis spinisve subosseis, folia coriacea.

Capitulis fem. terminalis, basi foliis floralibus sub 12 cinctis, of these, 3 are outermost and largest, imbricate alternate, each is opposed to 3 or 4 inner ones which are gradually smaller, not exactly opposed to the insertion, but approaching to it, these are white, of the same shape as the true leaves, and also carinate, 2 serrulato-spinulosa, except towards the base where they are nearly smooth. The innermost occasionally quite linear, and unarmed, not out, topping the head.

Pistilla, squamis nullis, interspersis, in phalangis 3-5-7 sæpissime 6-dispositis, si 6, 4 exteriora, 2 interiora; the 2 in-

ternal ones are almost always ? conate, apice angulatis viridibus exceptis in pistillo composito, cuneato obovato, loculis totidem angustis.

Apex carpellororum angulato-sulcatus, sutura ventrale distincte. Stylo brevissimo. Stigma verticalibus discoidea semper axin phalangis spectans.

Epicarpium fibrosum præcipue apicem qua densum, secus facies appressus tenuæ loculus angustus e maxime partem placenta nuncupat. Placenta oblonga, convexa carnosa basi prope ovulo unico, anatropo in placent, semi-nudulant, et materia glutinoso quæ loculum replet.

Carpella interior insertione paullo superiora, minora, ne squamæ imo inter phalanges adsunt.

Ovulum appears to be often campylitropous owing to the thick base of the outer coat. Raphe semi-complete.

1. Female capitulus Nat. size.
2. A Phalanx of Pistilla.
3. Do. vertical view of apex.
4. Long section of do.
5. Long section of a single pistillum.

a. Placental surface, *b* situation of ovula, *c* cavity filled with a glary mucilage, *d* dorsal vasc. fasc.

4*a*, Transverse of 4.

6. Placental surface and ovulum (in front.)

7, 7. Ovula.

3. *Pandanus* (*Euphalangia*) *atrocarpus.*

Statura ut videtur, humilis.

Fol : acuminata solito armata 5 to 6 ft. long, 2 inches 2½ broad.

Capitula, fruit numerous on a flexuose terminal axis, angular and scarred from fall of bracts, obovate very echinate muricate, of a dusky colour becoming black on drying.

Pericarp, on parts not appressed, conico-angular, acute, bearing on the lower side of the apex, a short linear stigmatic surface in the non-appressed parts, shortly muricate, with a hard conical process.

The inner part of the pericarp is continuous with the style, the canal easily separates from the outer fibrous scarcely baccate epicarp, and is divided into two cavities by an oblique septum, the young seed occupying the lower one; the exserted free apex of the epicarp is solid, there is no thickening of the placenta.

Immature seeds alone seen.

The Malacca or Malay name is Pandang *Ootan?* which signifies *Useful.*

Pandanus; trunco breve, foliis magnis, triplici series armatis; fructibus sessilibus, spicatis obovato-pyriforme. Pericarpiorum apicibus muricatis.

The tunic surrounding the striated portion is the epicarp, as it is continuous above with the style. The striated portion has a septum above the seed, above which it is hollow and empty.

In the character of Pandanus, the putamen is said to be osseous, in this, it is almost fibrous.

The placenta is said to be parietal, and the seed to form its base; in this, the seed seems to be erect, with a very long setaceous funicle passing down the actual base of the carpella. Tegument single, raphe broad, chalaza oval, situated some way below the apex, of the seed.

This is the 4th species of the non-phalangeal group, the 5th of this place is a genuine Pandanus.

PALMACEÆ.

Slackia.

Slackia geonomiformis, CCXLIII. *Pal. Brit. Ind.* Tab. 234.

Truncus 2-3 pedalis gracilis, diametro ⅜ uncialis, crebre annulatus. Corona ratione plantæ copia densa. Vaginæ nudæ (spathiformes) basi amplexicaules, striatæ spithamææ subito in petiolum subpedalem attenuatæ.

Folia pinnata, 3-3½ pedalia; pinnæ basi obliquæ, pedales, vel ultra, lineares, bi-tri-carinatæ; margo inferior oblique sensim acuminatus, margo superior apice oblique truncato-acuminatus: terminalis bilobis, lobis latis truncatis, lobulatis, lobulis denticulatis. Fila tenuissima interjecta.

Spatha inferior extrorsum aperta, spatha superior convoluto-involuta extrorsum hians.

Spadix cylindraceo-clavata, decurvata, sæpe sigmoideim flexa, bifurca, fructus elongata, 1-1½ pedalis, spathæ spathellæque vestigius basin versus, nutante-pendula, superficie irregulari lacera. Pars florigera incrassata, subrotunda, aspectu spongiosa: excavationes margine fimbriatæ, inferiori margine membranaceo.

Pedunculus compressus, vel sub 3-gonus, basi spatha, supra paullo spathellæ vestigius cinctus, si simplex superne nudus, si bifurcus bractea ad furcam.

Flores 2, basi immersi, undique inserti.

Masculi calyx: 3-sepala, subcoriacea, subcarinata, oblonga, concava, striatula.

Petala indurata coriacea striata subacuta, æstivatione valvata. Stamina 6, filamenta crassiuscula ima basi connata. Antheræ magnæ biloculares, versatiles, apice filament. attenuato per æstivationem introflexo inter filamenti partem robustiorem, et antheram per æstivationem erectæ in apice filamento introflexo-geniculato.

Pistillum abortivum e basi usque ad stigma discoideum 3-sulcatum attenuatum, angulato-sulcatum.

Flores fœminei in iisdem spadicibus, eodem more subim-

mersi, tribracteati, bracteis in fundis excavationum persistentibus. Sepala maris. Petala latiora cuspide brevi lata, æstivatione imbricativa.

Stamina rudimentaria 6, basi coalita, ob-pistilli-gibbositatem quasi unilateralia.

Ovarium obliquum e basi rotundato conico-attenuatum, ad latus gibbos. 1-loculare. Stylus brevissimus. Stigmata tria ovata parva recurva. Ovulum 1, appenso-pendulum, foramen inferne et versus axim spectans.

Fructus basi periantheo cinctus albus, solitarius oblongo-obovatus, obliquissimi, ob stylum et carpellum abortiva basilari-facta (*retort shaped*) collo brevissimo, sub exsuccus. Mesocarpium fibris vasculari-reticulatum. Endocarpium duriusculum nitido, fragile, e cellulis transversis, intus reticulato-venosum.

Semen majusculum erectum, tegumentum membranaceum, tenue simpliciter inflexum, inflexuris longitudinalibus profundiusculis. Albumen corneum parce ruminatum.

Embryo conicus basilaris foramine oppositus lateralis.

HAB. In sylvis humidis. *Ayer Punus, Rhim,* satis communis *July,* 1843.

This palm is good deal like *Bentinckia* in the shape of the fruit, and spadix-branches, but less *Arecoid,* none of the spathes being complete; but differs in the imbricate female corolla, the ruminate albumen, and bilocular ovarium.

It is also like *Geonoma,* especially in habit, but both the spathes are incomplete, style *terminal*! not a berry, and the albumen is ruminate.

Pl. CCLIII.

1. Apex of a Spadix.
2. Male flower, the concavity at its base is due to the situation of the female flower-bud.
3. Stamina of a bud; at the apex is seen the stigma.
4. Oblique dorsal view of stamen, shewing the inflection of the filament.
5. Lateral do., 6 male flower.

7. Petal of do., 8 genitalia of do., stamina spread out to shew the barren pistillum., 9 Pollen.
10. Part of spadix, with two fecundated females.
11. One of these.
12. Section of Pistillum exposing the ovulum.
13. Ovulum.
14. Part of a spadix more advanced.
15. Spadix of fruit (part of.)
16. A fruit.
17. Do. long section, *a* shews the ruminations, *b* endocarp, *c* embryo, *d* mesocarp.
18. Seed dorsally viewed.
19. Do. in front, shewing large depression at the site of the foramen.
20. Transverse, shewing simple rumination.

Areca.

1. *Areca curvata.* CCXLVIII.

Caudice annulato-articulato, 5-7 pedale, gracile, sursum ferrugin. pube asperula.

Petiolis longe vaginantibus vaginis coriaceis, striatis, asperis, pube ferruginea, in parte supra vaginam canaliculata. Frondibus pinnatis (laceratione) pinnis valde inæqualibus insertione obliquis e basi lata, oblique acuminatissimis, integris, venis primariis carinulatis pluribus.

Spadix (e caulis parte vetust.,) infra partem foliosam pendula, filiformis, *the length of a finger*, glaucescens.

Fructibus distichis, basi bracteolata albidis, thickly and obtusely subulate, and falciformly curved,*

Fructus fibrosus sub induratus (apice areola minuto sphacelato, an semen eruptum?) albumen, huic conformum corneum solidum.

Embryo minutus basilaris, *conicus.* Tegumen 1, tenuissimum memb. cellul. raphe apicem fere attingens. There is on each

* For the fruit of this species see *A. paradoxa.* Palms of Brit. India Pl. 232. Fig. 3.

side a primary vessel which runs up nearly to the top, when it joins the dorsal vessel, or becomes reflexed much earlier, these reflexed, vessels are as perfect as what *I call the primary* vessels, so, they may be primary too.

Along the lines of the vessels, the albumen is slightly furrowed.

The conical head of the radicle is not enclosed in albumen.

HAB.—In dense forests near the base of *Mirang, at the* foot of Mount Ophir.

It fruits in Feby.

Malay name of this Plant is *Nibool.*

Gen. novum. *Cladosperma,* dicanda; ab *Arecis distichis* seminis forma et structura discrepans.

Dissections of the Fruit, Pl. CCXLVIII. 1 Fruit, 2 epicarp, 3 long section, 4 seed outside, 5 ditto cut down. 6 Embryo. 7 Ditto.

Flores fæminei exacte distichi, basi bract. brevi lata suffult. Perigonio e squamis 6, biseriatis, alternant, (tertio exteriorum antico) longitud. æqual. coriaceo-scariosis. Stam. rudim. o.

Pistillo oblongo apice quasi truncato stigmatoso, parte perianth. incluso sulcato plicato.

Only seen after fecundation. Semen 1-erect.

2. *Areca hæmatocarpon,* Palm. Brit. Ind. Pl. 232. Fig. 2.

Caudice 10-12 pedale conspicue et late annulat. Vaginis coriaceo-areolatis; very strong oblique, 1½ foot in length.

Petiolis suberectis bipedal. Frond (pars lamel.) 5-6 pedal. nutant. ascend. pinnulis linearib. 1½ pedal. alternant. basi anguste insert., margo infer oblique acuminat. 3 carinat. carina medio tantum descendent. superior acute profunde bifidis, apice truncato multo partito.

Spadicis pedalis e vaginis lapsis deflexo-pendulis, sanguineis ramosis, cæterum ut in *Areca curvata.*

Cocos.

Cocos nana, Griff.

Habit and appearance exactly like that of *C. nucifera*, the foliage, and the canvas-like rete being the same.

But the stature, at least that of the stem, is dwarf, and the inflorescence, and nuts are also so small, that it well merits the name of dwarf Cocoanut.

Spadix before opening fusiform, ligneous, with long deep furrows, beautifully representing the plicate appearance of a very young leaf.

Spatha, at least the inner and larger (subsequent to dehiscence) posticous! coriaceo-ligneous, boat-shaped.

Spadix about the length of the spatha, with many simple rather zig-zag subulate branches, and altogether, flowers included, greenish. Flowers about tetrastichous, male much more numerons, only one female in the lower part of some branches, solitary and white, the males are in pairs, or by abortion solitary.

Male calyx small: sepals carinate. Petals oblong, subacute, valvate hard coriaceous.

Stamens 6. Anthers linear, inserted about the middle, almost versatile, greenish, the cells after dehiscence variously twisted. Pollen white when dry, lanceolate, and presenting 3 deep furrows, in water globose. A well defined rudimentary pistil subulately, and deeply 3-lobed, of white colour.

Female. At least after fecundation, and while many male s yet remain perfect and many unopened; large, as big as a crab-apple, no distinction of calyx and corolla, but 6 round concave highly imbricate bract-like leaves form the perianth. The great bulk of the ovary is solid, with 3 canals, as in *Borassus*, round each, the tissue is tinged with yellow. The canals are linear, and do not communicate, at least in the lower part of the fruit, although a line marks out the usual triangles. Ovary at the base 3-celled, with one small ovule in each.

Fruit rather large, elliptico-oblong, base rather deeply depressed, apex 3-lobed, with a large disc which is perhaps the remants of a style? colour between, green and yellowish striated.

Borassus.

Borassus.

Spathæ plures foliaceo-striatæ, incompletæ, spadix ramosus, ramis *bi-tri* spadicosæ. Spadiculæ cylindraceæ, squamis latis subconnatis centro emarginatis vel sinugeris arcte imbricatæ.

Foveolæ profundæ, ex angulo superior. florigeræ.

Nodus floriger gyratus, alabastris interior et inferioribus scrotinis.

Flores subbiseriati, bracteati glumacei. Sepala 3, cuneata concava subunguiculata. Cor. longe pedicellat. (pedicello subito evoluto? imbricata, 3 petala, petalis cuneatis concavis, patentia.

Stam. 6, biseriata, serie externe petalis alternant. Anth. magnæ biloculares, longitudine dehiscentes. Rudim. fæm. o.

Spadiculæ fæmineæ, ratione masculi, paucifloræ, bracteis latissimis ⅔ vaginant.

Fl. inferioribus binatis reliquis solitariis.

Bracteæ (vel calyx) subternæ.

Cal. 3-sepalus; corolla tripetala, but there is no distinction whatever between the series, all are glumaceous, rough, and imbricated, the inner series is the largest, and prettily stalked, and veined towards the edges.

The Ovary has the base surrounded by 6 barren stamens, the filament is broad at the base, and united into an annulus.

The ovarium is the size of a large apple, terminated by a bilobed stigma, with 3 chinks near the apex, indicating the lines of composition; substance very thick fibrous and fleshy, tough, with 3 cells.

Fruit roundish, black, surrounded at about the lower $\frac{1}{3}$ by the perianth, dilated or split, depressed at the apex, the three chinks are permanent, as also the stigmatic cleft.

This is a remarkable palm, evidently *suæ sectionis*, owing to the recurved, or gyrate nodes of inflorescence, the glumaceous perianth, and the stalk of the corolla and stamina.

Allied to this, (at least judging from the aggregate flowers, and texture of perianth) is one of the Mergue Palms.

It certainly approaches *Nipa* in its perianth, cylindraceous amenta, and sudden exsertion of the corolla and stamina, although, in *Nipa*, the column only bears filaments.

Pyrenæ 1-3, compressæ, sub-obcordatæ, crassæ, durissimæ, fibroso-osseæ, internally lined with a lax rete of light brownish yellow fibres, with 2 stout entering rounded processes, apice foramine perforat.

The seed conform to the pyrene, there is no proper separable tegument in contact with the lax rete. Albumen corneum covered outside with yellowish mucilage. Embryo superior, opposite the foramen of the pyrene, and indicated by a mammilla in the albumen clavato-conicus. 3 conspicuous canals of communication in the centre.

Ovula small ascending from the top of a stout placenta, another resemblance to Pandaneæ : it is surrounded by mucilage, erect antitropous.

Nucleus reduced to a membrane at the epoch of inflorescence.*

NIPA.

Nipa fruticans. CCXLIV.

Inflorescentia paniculata e *terra*, uno centro terminal. cæteris masculis horumque racemi vel divisiones inflorescentiæ sub fastigiati. Tegitur omnino bracteis vaginantibus, limbo ventricoso scaphiforme vel exacte spathaceo, nempe antice dehiscens.

* Embryo etc. is inverted in Gærtner's figure.

Bracteæ initio pulchre badio-aurantiaceæ, odorem *Spiræaceæ spirant*, coriaceæ, quickly becoming hard, and somewhat withered. Ultimæ etiam vel spatharum in modo vel bractearam dehiscent, si duo, ut frequentius, externa ob-pressione verticillata spathacea bicarinata evadit.

Pedunculus spatha brevior medium circiter bracteatus, bractea, elongata acuminata basi lata affixa, margin. subinvolutis. Spadix erectus, demum semi-nutans, cylindracea e maxima parte exsertus, undique floribus masculis tectus, bracteolis nullis vel minimis setiformibus interspersis.

Perianthium 6 sepalum, biseriatum. Sepala lineari-cuneata apice spathulata depressa, æstivatione leviter imbricata, saltem series interna, venosa, persistentia, scariosa.

Collumna staminum parte antherifera exserta, cylindracea robusto, vasc. fasc. 3. Antheræ apice collumnæ evidenter 3, cæterum videntur 6, uniloculares, loculis adnatis longis, centro dehiscent.

Pollen copiosum papillis hispidum, in aquam subglobosum e porosum e plicatum videtur. Setæ mixed with the flowers at the very base, flowers sometimes developed here and there, on the naked part of the spadix, basilar flowers often distorted.

Nothing can be clearer than the ternary composition of the collum at an early period.

There is all sorts of variety in the development of the bracteoles or spathelles from the peduncles, sometimes these are actually spathiform, not including however the spadix, at others they are linear, sometimes they seem wanting.

The Rhizomata are epiterraneous or subterraneous: the fronds are of immense, size 15 feet long; the petiole sheathing, at the base stout, and cellular, flat on the upper surface, round below; the pinnæ are distichous with the palmoid circular insertion, 3½ feet long, glaucous underneath, *more Palmarum* 3-carinate ending in a long awl-shaped point, which is another palmoid mark

To the midrib underneath, are attached by the middle, brown narrow long scales. The petiole is above furnished with

an elevated central line, to which the costæ reach, and down which they are decurrent a short way.

Pinnules tough, coriaceous, upper and lower ones much reduced and narrow, upper not awned, but with an obtuse emarginate coriaceous point.

Capitul. fæmin. axim inflorescentiæ terminans, bracteis peduncul. crassa, ex axillis mascul. solitar. exserent valde concavæ, interdum bi-tripartit, axim vel peduncul. nempe omnino cingent, et latississime insertion, insertæ margine supercurrente.

Bracteæ immediate capitulæ stipantes, basi late, margin. *supercurrenti*, extime bilobæ, interior integræ ovato-lanceolatæ vel sublanceolatæ acuminatæ. Paucæ angustiores. Pistilla antepenultima suffultient.

Pistilla dense aggregata cuneato-obovata, pressione varie angulata, parte libera, vel dimid. super. supra angulata, pyramidalia, ad apicem sæpius faceium inferiori alequando superiori rima glutinose hiante (Stigmatosa.)

The irregularity in situation or direction of the stigmata at once suggests that the carpella are not solitary, and although it would be improper to say positively, that they are not, merely from adult specimens, yet I believe they may always be recognised as ternarily arranged.

One thing is obvious, that the diversity in the situation of the stigmatic chinks, points out that the same carpella are not always developed. In Pandanus too, the stigmata all have the same direction which is another point of difference.

The appearance of the stigmata and the pistilla, is not very unlike certain instances of true Gymnospermous ovules.

All the bracts are deflexed from the base, and are thence quickly ascending.

This view is confirmed by the fact, that if a set be selected in which the stigmata point (as in all such cases they do) towards each other, no perianthial scales will be found between them.

1-locularia, 1-ovulata, ovulo erecto-anatropo tegumento

unico, nucleo apice papilloso; cava forsan membrana adhærent vestit.

Fructus compositus, size of 1 foot in diameter, and so heavy, as to be nodding; peduncle scaly with the remains of the sheaths.

The drupes are crowded most closely, and are with some difficulty separated, their upper thirds free, with 3 or more prominent angles, and smaller intervening ones, tipped with the conical stigmatiferous apex, exserted or free part dark brown, many are abortive.

The axis on which they are arranged is about ⅓ of the whole diameter, and the angularly areolate remains of the perianth continue unaltered.

Drupa? ambita longitudinaliter obovata; epicarpio carnoso, succulento, with very tough fibres interspersed; mesocarpio indurato, fibroso densissimo; endocarpio? spongioso farinaceo fibris vel venis interjectis!!

Semen magnitudinem ovi gallinæ, erectum; hilo lato, cavitat. implens. Tegumentum coriaceum intus viscosum, cum endocarp. adhærent venosum.

Albumen cartilaginous, like a shell, very tough, more lax in the centre and with a tendency to form a cavity.

Embryo ob-conicus basilaris, *Areolis binis* ad basin. On one side of the endocarp is a well pronounced intrant angle, there is a corresponding one in the tegument, and in the albumen itself. But what this is, must be determined by younger fruits.

Raphe lata ½ completa, lateribus et apicem ramosis, ramis disposed over the face of the seed, with a tendency to prolong and converge to the situation of the mycropyle.

One of the angles of the ovary always corresponds with the stigma, there is no difficulty otherwise in accounting for ventral sature.

Additional reasons for considering Nipa to be a Palm, exists in the germination, and in the vernation of the leaves, The vernation is remarkable, the extrorse direction of the conduplication, depends on the insertion of the pinnulæ.

The vernation is plicato-conduplicate, with a tendency in both margins to be reduplicated towards the axis, this last is carried to a considerable extent in the upper pinnulæ. These again are appressed to the petiole.

In Pandanus nothing of the kind occurs, the first formed leaves are like the mature ones, in *Nipa*, they are reduced to the petioles.

The germinating fruit of Nipa, has all the fibres at the narrowest part or base denuded, and brush-like. The mesocarp is rich brown spongy, permeated by fibres; the endocarp is tough and hard, the surface on the section is shining and altogether *Palmoid*.

Then comes a lighter brown coloured spongy substance, also permeated by fibres, which adheres to the albumen and disguises its proper covering, the albumen is decidedly Palmine, very tough, and cartilaginous, and the section wherever it is irregular is as bestoid. The central cavity is large and surrounded with albumen, opaque, asbestoid, and occupied by the enlarged cotyledon. The outline of the seed itself is bi-lateral, the young leaves, and the radicles passing out from the sinus, where the endocarp is wanting.

The cotyledon which entirely fills the cavity is an ovate, subcordate body, at the base of a spongy soft texture exactly like pith.

Under a lens, the albumen appears as if it were composed of transverse cells, those beyond the influence of the cotyledons have a firm hyaline appearance. The asbestoid part may be described as marcescent.

The cells appear to have very thick walls.

Iodine scarcely exerts any action on the asbestoid part, it tinges the solid part with the usual fuscous colour, and then becomes rather brown or quite brown. Iodine changes to violet blue the contents of the cells, which are highly but minutely granular.

The cells communicate freely with one another, this is especially evident on a long section, the granules are of unequal size, but most are very small, and at first very mobile.

There is no difficulty in conjecturing the use of the communications between the cells.

The asbestoid cells soon lose their firm appearance, and almost all their granules.

The pyramidal leaves of Nipa are also Palmine.

In another instance in which but one radicle had been thrown out without any other sign of development, the cotyledon was irregular on its surface, and nearly filled the cavity of the seed, having absorbed almost all the albumen, the radicle arose from its surface, considerably within the circular opening in the fruit, and opposite to the hilum.

The parts within represented the neck of the germinating embryo, and sheaths are visible when the young plant is 3-4 feet high, the axis then taken a descending direction in addition to its pushing out leaves upwards, so that a bulbous body is formed to such an extent as to perforate, or tear away the base of the vagina of the elamellar *petioles* ; or leaves.

Nipa fruticans Pl. CCXLVI.

1. Germinating seed.
2. *x* Vagina of leaf, *w* radicles, *v* cotyledon, *s* albumen, *z*. transverse section of albumen perfect, *y* longitudinal ditto, *r* cellular fibrous endocarp and tegument, *t* mesocarpe *u* endocarp.
3. *q* first vagina, *m* second sheath, *n* original radicle, *o* longit. *p* constricted by the annular opening.
4. *l* ampulate collum, *g k* first lamellar leaf, *h j* second lamellar leaf, *f i* third lameller leaf, *e* first plicate leaf.
5. *a* Collum. *a* first lamellar leaf, *c* first elamellar petiole, *b* second elamellar petiole, *d* first plicate leaf.

Nipa fruticans. CCXLVII.

1, 2, 3, 5. Represent various forms of the male inflorescence, before the rupture of the bracts or spathes.

5. One of the same opened, one *ament* ? is ½ enclosed in a spathella, that of the other is reduced to a line or lamina.
6. Single amentum, its spathe and spathellæ.
7. Do. spathe removed.

8. Æstivation *a, a, a* outer sepals.
9. Male flower bud.
10. Same, one sepal removed the rest opened out.
11. Collum.
12. Æstivation, of 9, *a, a, a* outer sepals.
13. Male flower after expansion.
14. Collum of the same.
15. Transverse section of collum.
16. Oblique vertical view of anthers, shews that the collum does not extend as far as the cells.
17. Collum: after dehiscens, the anthers are seen to be 3, and separate at the apex.
18. Pollen.
19, Transverse section of the collum and anthers.
20. Same with *perianth* segments.
21. Partiis sitis et alternatio.

Nipa fruticans. Pl. CCLV.

1. Female capitulus, about the time of impregnation.
2, 2. Scales or segments of the perianth, which occur round each group of Pistilla.
3*a*. Pistilla, 3. Long section of ditto.
4. Do. long section.
5. Transverse section of the ovary, just above the ovulum.
6. Ovula.
7. Do. Long section.
8. Nucleus of do. (Inner tegum. not now distinct.)
9. Long section of fruit; *b, b* mesocarp, dense and cartilagino-corneous; *c, c*. loose cellular fibrous endocarp; *d, d* tegumen of the seed; *e, e* albumen with its cavity; *f* embryo.
10. Seed detached, its coat is loosely farinaceo-cellular, and vascular, but is here concealed by the adhesion of the inner layer of endocarp.
11. Seed: endocarp rubbed off, this shews the raphe, its ramification, and the hilum at *b*, and the direction of the radicle at *a, and* the cochlear concavity of one face.

12. Long section of the seed, the endocarp not being rubbed off; *a* the cavity of the albumen; *b* radicle; *c* albumen; *d* tegumen : *e* endocarp layer.
13. Seed : coat removed, shews the cavity of the cochlear of surface and radicle at *a*.
14. Base of Do. viewed vertically.
15. Embryo, 16. Do. Oblique view of radicular end.
17. Section of do.

Obs. *Nipa* is the only rhizomatous form of Palm known to me; its rhizomata are perfectly gigantic, 1½ feet in diameter, and from the lower face throwing out innumerable roots, and from its vegetating apex, several systems of branches, all imbricated with the great cellular sheathing bases of the petioles.

When thrown ashore, it looks more like some huge marine *Cephalopode* than a plant.

HYDROCHARACEÆ.

Enhalus.

Enhalus, Pl. CCXLIX. Fig. 1. CCL.

Planta pelagica ? dioica.

Folia lineari-loriformia longissima plana, marginibus incrassatis et involutis folii apice excepto præsertim basin versus qua amplectentia intra sunt ½-⅝ unciæ lata,apice rotundata, et denticulata longitudinaliter venosa, venulis transversis hinc illinc superadditi s.

Owing to their disposition they are all parallel, one with the other. Brown linear oblong or round bodies occur towards the apex of the leaf chiefly, especially the linear ones extend with the longitudinal veins. The leaf consists of one series of chambers: the septa venigerous, there is a central larger vein, and one in the thickened margin still larger, this is sometimes permanent, with the shape of a hair-like bristle. Apertam nondum vidi.

Inflorescentia axillaris spathacea. Pedunculus compressus. sursum paullo ampliatus fæmineus saltem spiralis.

Spatha diphylla, foliis conduplicatis, exteriore interius ½ amplectente, fæmineæ longiora, secus carinam dense fibrillosa, fimbriata, uti mascula sed hinc lineæ 1-2 utrinque barbatulæ incomplete adduntur. Venatio longitudinalis ramulis transversis anastomosantibus. Peduncle with air chambers round the centre.

Flores masculi minuti albi. Sepala petalaque tria, præ tenera, oblonga, subæqualia alternantia, imbricata, his magis petaloideis.

Stamina 3, sepalis opposita. Filam. brevissimo. Antheræ oblongæ erectæ biloculares, papillosæ apertas non vidi lateraliter dehiscentes ; cellulis endothecii simplicibus.

Pollen maximum, eporosum eplicatum ; in aqua sub-sphæricum. Rudimentary pistilla o.

Flos fæmineus solitarius in sinu folii interioris spathæ suæ propriæ. *Cujus foliola semi patentia sunt*. Perianthium superum masculo pluries majus.

Sepala 3, oblonga, imbricata. Petala totidem alternantia linearia, sepalis longiora subvalvata ; *pagina* exterior transversa, pulcherrima undulato-plicata, (about 3 series of undulations, connected by transverse bars or folds, these only affect the inner surface so they are mere processes.) Sepalis manu apertis mox elastica expandentia. Stamina o.

Ovarium compressum, longe rostratum, marginibus processubus papillosis donatum interjectis lineis impressionum in super rostratæ collumve in processus subulatos integros, vel 1-3 dentatos amplificatis, 1 loculare. Placentæ 6, bi-lamellatæ, lamellæ distinctæ ad axin productæ sed nullo modo coalitæ, tot quot lineæ, processum et impressionem et his alternæ ? Ovula 1-seriata pauca : (nullis interjectis inter lamellas contiguas placentarum) angulo exteriori placentæ et parietis locali affixa anatropa. Tegumenta bina.

Stigmata duodecim lineari-subulata secus margines papil-

lis prædita, vel potius styli 6, brevissimi profunde ad basi fere bipartite, lacineæ &c. &c.

Each pair of stigmatic surfaces is continuous with the conducting, or placental lines of the rostrum, and these lines appeared bilamellar. Each lacinia has 2 to 3 single vessels at the base, one central throughout.

Fructus basi spatha *divulsa* (pushed or expanded) immulata suffultus ovatus longe rostrata, lineæ impressionem et rumentigeræ vel fibrillosæ, exsuccus sub 6 locularis, loculis 4 magis completis ?

Semina plura (pauca) magna, 1 seriata conica vel pressione conico-angulata more ovulorum affixa. Tegumenta bina, utrumque cellulosa membranacea tenue: interiori in super chalazam crassiove. Raphe lineata interdum cariniformis semi-completa. Albumen o.

Embryo magnis forma exterioris seminis. Radicula latus maxima, albida, chiefly distinguished by a white appearance, truncata medio quasi umbonata ? vel umbilicata ? Cotyledone subconica viridis hinc rima bilabiata, radicula prope labia separantur (labio altero exterior) exarata.

Plumula recondita maxima valde *completa* : polyphylla, foliola exteriora e basin lineare oblonga rotundata apice serrulata, just like the apices of the mature leaves.

Fragments of this are common enough on the beach near the race course at Singapore. I have also seen it on Pula Bissar beach, I have examined one male spatha, one female ditto and one ditto fruit.

I have very little doubt that this is Enhalus L. C. R. Endl. Genera no. 1212 p. 162, four of the stigmata having been taken for barren stamina. The chief difference is in the fruit, which is described as compressed and drupaceous.

The description in Willdenow, Tom. IV. Part II. p. 821. agrees remarkably well particularly as to the margination of the leaves, the undulation of the petals, and the stigmata, which are described as anthers.

There is some discrepancy as to the germen, which he

says is imbricated with scales on every side, and the same concerning the drupe and its "compressia".

s. Transverse section of ovary; *t* ovule (made up,) *r* ditto; *p*. *n* Female flowers; *m* ditto.

q. Stigma; *o* one branch of ditto, with a portion magnified $\frac{1}{10}$.

j. Radicular end of seed.

g. *k* Raphe.

l. Chalaza; *h*, *i* Hilum.

a. Plumula; *b* outer membrane, *c* inner ditto, *e* involution of cotyledone, *d* radicle.

2. *Enhalus marinus*, Pl. CCXLIX. Figs. U. to X.

I have since found this common among coral and mud banks round the Pulo Bissar, and in abundance in the small *lagoon* of Pulo Pangang, generally very small, only reaching a tolerable size where the lowest ebb water is 2 or 3 feet deep.

The Rhizoma is firmly creeping, covered with stout black bristly fibres. Radicles simple, stout, cellular spongy fibrilloso hairy.

It is also rather hairy from the lateral fibres of the leaves being persistent.

The stalk of the fruit is spirally bent; in the *lagoon*, where fruit specimens were found, it was sub-immersed at the lowest ebb, and erect. The dehiscence is deliquescent as in Nymphæa, the pericarp breaking up irregularly, its substance farinaceo-spongy, seeds green mucilaginous or slippery from adhering part of pericarp germinating in the capsule, that is the plumula is exserted, although the radicle is not lengthened.

No flowering specimens found, it is rare even in fruit.

Pulo Pangang, Sept. 22*nd*, 1842. This is not an estuary plant here.

CCL. Fig. 4.

1. Centre of radicle dense fibrous? small.
2. The transparent radiating cellular tissue, inter cellular

passages opaque. These two form the firm part.

3. Then continuously radiating lax spongy tissue, cells and passages opaque by air, particularly the latter, so lax that a thin section is difficult.
4. Then a small ring of white cellular tissue.
5. And then the cutis or cuticular tissue which is thickish and opaque.

NIADACEÆ.

General Remarks.

The Indian species of Naias, are neither Caulineæ or Naiades of Endlicher, having the anthers of the former according to his definition, with the naked females of the latter.

There are certain appearances connected with the Pistillum that leads me to suspect that Caulineæ have not been exactly described: for there is an appearance of a tunic gradually losing itself up the style, but which certainly does not depend upon any great peculiarity of structure, I shall not be at all surprised if Endlicher's descriptions of the females of both are faulty, he says that the epicarpium of Naias is membranous and becomes detached!

The structure or development is remarkable, and that particular line of gradation which enables us to identify dissimilar structures at different periods of development, is so obscured, that I am unwilling to speak confidently of the male and female organs at a very early period.

The *earliest*? identical character of the female, is to be found in the oblong shape of the pistillum, which will be found broadly open at the apex, the orifice being somewhat bi-lobed, the nucleus reaches to the fundus of the orifice, but is not exserted.

I have seen no gradation of development of the outer tunic of the male: the transition from a rudimentary ½ naked stamen, to a full formed one, appearing to be remarkably sud-

den. The outer tunic approaches the leaves in structure as is pointed out by the fuscous teeth: this would seem to point out, that the disposition of the male flowers in the two species may vary.

In *Naias valisnerioides,* which appears to vary in the absence of a tunic to the stamina, the ovarium is anatropous, the foramen is in close relation with large lax cells, radiating somewhat from the short funicle. Of similar structure are cells radiating from the bottom of the stigmatic canal, where it opens into the ovary. And here I have seen traces of an excessively fine membrane, which may perhaps line the whole ovary, and which is conducting: similar membranous conducting tissue exists in Nelumbium.

The pollen tubes are frequently seen passing down over the surface of the ovulum, they are generally lost sight of in the conducting tissue near the foramen, and are excessively fine.

Even at an early period, the nucleus adheres to the second tegument. After fecundation, the inner tegument becomes very fine, and the nucleus becomes hollowed out along its axis, and filled or turgid with juice

When the embryo is somewhat developed, the outer coat or layer of seed, (or testa) is cellular; the cells are large containing green granules, the inner layer is beginning to be crustaceous and is composed of a single series of oblong irregular cells, highly punctate. The second tegumen is reduced to a membrano-cellular membrane, its apex is mammilliform acute, this adheres strongly to the apex of the nucleus, and gives it a radiate cellular appearance.

The nucleary membrane is thin, tending to a leathery consistence, it is lined by a very fine cell, the membrane is composed of one series of cells, with minute granular matter.

The embryo fills only a small part of the cavity, its funicle is composed of 3 cells, the terminal one is rounded and filled with more grumous contents, to this adheres an amorphous tubular substance.

It is curious that in all these plants, the embryonary sac is

scarcely demonstrable, but as the funicle of the embryo is not of an ordinary structure in this, and a lining may be ascertained in the innermost coat of the others, I prefer maintaining the opinion which I have long held, that it is the *podosperm* in Ceratophyllum, Ruppia, etc. which is so enormously developed.

Instances of adhering very fine embryonary sacs are not uncommon.

I. *Potamogeton*. Fl. spicati hermaph. Perianth 4-sepalia. Stam. 4. Sepalis opposit. ovaria 4, sepalis alternantia. Ovulis campanulitropis. Fructus.— ?

Flores herbacei.

II. *Aponogeton*. Fl. spicati hermaph. Sepalis 2 inferioribus, 3 tio postico o. Stam. 6-3 longiora, sepalis alternantia.

Ovaria 3, rostrata, staminibus brevioribus oppositis. Capsulæ farinaceæ, seminibus pluribus, testa sulcata, membranacea.

Embryo orthotropis, cotyledone magna, (radicula, brevi, plumula in rima recondit.)

Rappia. Spadicos. hermaph. Per. o. Stam. 4 (unilocul.)

Ovaria 4. Stigmata discoidea angulato-reniformia, ovula pendula anatropa. Fruct. drupacea. Embryo radicula maxime in cotyl. subito constrictis; cotyledonia teretiuscula, brevi, pressed down on upper end of radicle.

III. *Zanichellia*, fl. monoici, masc. Stam. 1, nudum. Fæm. Perianth cupuliforme. Ovar. 2-4 uni-ovulata, stigmatibus (just exserted,) reniformi-cordatis, ovulum pendulum antitropum. Embryo radicula maxime, cotyledone subulato-longissim. vernatione *circinnato*, (transversely.) Plumula recondita.

IV. *Naias*. Monoici Fl. solitarii. Masc. anthera bi-perianthio membranaceo celluloso apice aperto.

Fæm. axillares, nudi, ovarium ovulo unico erecto. Stylo bipartito. Stigmata bina linearia.

NAIAS.

1. *Naias rigida*. Griff.

[Foliis carnosis rigidis (e tela composita cellulosa,) alternis,

inter spatiis concavis. Pistil. perianthеo tubuloso apice spiculigero includ.

HAB. in aquis stagnantibus. Serampore.

The leaves appear to me to be the only prominent parts for specific distinction, the teeth in this are distinctly different, the terminal fuscous cell being alone simple. The female presents no appreciable difference perhaps. The habit is distinct and the colour blackish green.

The process of fecundation is pointed out by a fuscescent deliquescent substance adhering to the stigmata, but I see no definition of boyeau, although the pollen grains may be traced in the deliquescent looking mass, but the appearance is obscured by adhering amylaceous matter.

The perianth is not constant. It appears to be a deciduous species.]

2. Naias *fucoides Griff.* Pl. CCLI. Fig. I.

Robusta carnosa fusca fragilis.

Emersa, apicibus ramorum etc. exceptis qui submersi, dichotoma. Internodiis longiusculis, articulos versus, dentatis. Foliis ternatis subverticillatis, planiusculis (vaginis simplicibus,) latis carnosis grosse dentatis, secus linea mesiam etiam dentigera (dent. opposit.) Fl. fæm. axillar. solitar. 1 in axilla uno tantum articulo cuidem ovarium oblongum, nudum. Stylo robusto longiusculo. Stigmata 2-3. Ovulum generis.

In aquis semistagnant. *Gurmab, Porta Bolan Affganisth.*

A remarkable species, appearing to be diœcious, yet all the ovaries are impregnated, it is much more robust than any other species I know, the leaves like those of the others are only pseudo verticillate, one produces a pistillum, the other vaginates the continuation of the axis, the third produces a branch. Between both conducting tissues, is spread a mucilaginous film. which forms a tunic to the ovulum, adhering firmly to the lower conducting tissues !!

The inner tegument is very fine and separates with the nu-

cleary! the apex of which is however *properly* radiately striate.

The embryo is very laxly cellular, like the others the plumula is, as it were, bi-lobed, a second rudimentary leaf being early developed, directed from the cotyledon, the funicle is rather long, and arises from a largish cell firmly adhering to the apex of the nucleus, and containing a grumous nucleus.

1. Portion of a female magnified.
2. Female flower.
3. Ovulum and conductorial apparatus of ditto.
4. Young fruit.
5. Young seed of ditto.
6. Upper ½ of tegumentum secundum and nucleus.
7. Apex of nucleus, (vertically.)
8. Apex of nucleus, and tegumentum secundum and attachment of embryo.
9. Embryo. 10. Funiculus.

Serampore, August 28th, 1841.

3. *Naias ternata,* Roxburgh, Pl. CCLII.

A watery cellular herb, with verticillate linear subulate toothed sessile leaves, dilated into membranes on either side at the base. Spath subcylindrical, fimbriate toothed at the apex, contents oblong ovate reddish opaque with a bi-dentate hyaline apex with green globules, in its earlier stages bilocular, looking vastly like an anther and containing granular mass.

Suffulted opposite to the leaf, by a small setaceous one with an undilated base, grains of pollen innumerable very large, apparently simple, whitish, opaque owing to the granular matter it contains.

This is a remarkable plant, and in its organisation extremely simple, with a decidedly dichotomous structure.

The flowers are diœcious, the male consisting of a large anther, bursting irregularly at the apex? and contained with-

in a membranous spathe. The pollen is simple, as in Naias; it undergoes no change in water except, perhaps a tendency to become globular: it is held together by some means or other, though not firmly, on its exit from the anthers, it is excessively abundant, and of a large size. The mobile granules have a truncate appearance, and are generally slightly curved; they are of irregular but larger size. The females are naked!

The ovarium is membranous and terminated by two stigmata which do not however present much stigmatic structure. The very young ovula are naked, the ovarium resulting from the development of two scales, then distinct, between which the nucleus may be seen projecting. The mature ovula are erect, consisting of one integument? with a large foramen near the hilum, where they form a gibbosity. The lower margin of this is fringed generally with clavate cells, the function of which is no doubt *conductorial.* The embryo is monocotyledonous with a slit; it is enclosed in the embryonary sac.

The female flowers are propped by a subulate leaf, which is opposed to that in whose axilla they are, this has an undilated base.

4. *Naias seminuda* Gr. Pls. CCLIII, CCLIV.

Alternatim ramosa, internodiis abbreviatis.

Fol. linearia patentia vel recurva subuncialia; basin versus canaliculata, medium supra planiuscula, margo subrectus denticulatus, ternis rarius in ramulis binis.

Fl. masculi subaxillares, subsessiles, (I have seen one with a long stalk) albidi, tunica antheræ accreta! apice biloba, lobis concavis, margine quasi incrassatis, intus apertis *pori more.*

Antheræ apex tantum soluta, bilocularis. Apice dehiscence? parietes membranacei tenuis simi-vix solubiles a parietibus perianthii. Pollen magnum oblongum apice utrinque quasi incurvo.

Fl. fœm. axillaris vel subaxillaris nuda interdum squama, fol. junioris mentientis hinc illinc suffulta. Perianth. o. Pistillum ovato-oblongum, apice in stylo attenuat. Stylo bi-partito, lobis linearibus secus faciem internam denticulatis, stigmatosis. Ovulum 1, erectum

Fructus, ovato-oblongus stylo terminat. Perianthium membranaceum.

Semen erectum, testa e cuto cellul. membranac. tenuis. solubile, cæterum crassa, coriacea crustacea e cellulis creber. punctulatis induratis conflat.

Tegumen interius, (secundine) tenuissim.

Tegumen nucleare subchartaceo-membranaceum, apice sæpius mamillat.

Embryo erectus, radicula mediocri. Cotyledone rectus longitud. seminis cavitat. Plumula intra rimam recondita.

From previous examinations, I have some suspicion that the ovulum is formed before the pistillum, from the two scaliform parts of which it projects at a very early period. If this is the case, not only will there be an extreme similarity between the pistil and male flower, but it will be proof that a pistillum may be completely imitated by a centrifugal growth.

I had named this species in allusion to the adhesion or union of the tunic, or perianth, to the male stamen ; this last being, when mature, reduced to a thin membranous bilocular ? sac, lining the cavity of the tunic.

I have not been able to ascertain the existence of an embryonary sac, yet I believe that it exists, as a thin lining to the large cavity existing in the nucleus about the period immediately subsequent to the fecundation.

The nucleus always appears to maintain its rounded apex, the mammilliform apex that generally becomes detached with it on dissection, being, I think, part of the neck of the inner membrane or endostome, with which the nucleus contracts at an early period, considerable adhesion.

The radiating cells of the apex of the nucleus, are so far

as I have been able to ascertain, partially due to a disposition of its proper cells, and perhaps partly to those of the neck of the endostome. This is worthy of notice, being obviously a representation of the highly developed radiated structure of a similar part or parts in Lemnaceæ.

I think that Naias helps to place in their true light, the structure of Ruppia, Zanichellia, and Ceratophyllum. For there is nothing in it, that would tend to induce us to assume that its embryo is formed outside its sac.

It is by no means probable, if such were the structure of the plants alluded to, that it would be abandoned in Naias, and this leads me to suggest, that unless the stalk of the embryo of Naias, can be considered an embryonary sac, the more legitimate supposition is, to consider that the embryo is, in all, intra-saccular ; and that the anomalies are attendant on enormous development of the podosperm.

[Traces of stamen deliquescent frond all such broken subvolute, lined in the flaccid membrane.

The development is remarkable, and that particular line of gradation which suffices us to identify structures at different periods of development is so obscured that I am unwilling to speak decisively on the male and female organs at a very early period.

Although the earliest identifiable character of the female is the oblong shape of the pistillum, which will be found to be open at the apex, the orifice being somewhat bi-lobed, the nucleus just reaches to the mouth, but is not exserted.]*

Explanation of Plate, CCLI. Fig. II.

If the apex of the axis be examined at a very early period, it will be found to present an irregular amorphous summit of

* The substance of this pencil note (written at time of observation on the original rough sketch of the parts described Pl. CCLI.) is incorporated by the author in what follows. Ed.

pulp or young cellular tissue, which is here and there bulged out into rounded protuberances, the future leaves? Below this occurs a crowded mass of young leaves, and cellular setiform bodies. And about this part, and perhaps generally axillary, will be found the cellular bodies, the commencement of the organs of reproduction.

These, very closely resemble an ovulum with one integument at an early period of development, the nucleus protruding considerably.

This protruded part is gradually covered in by the growth of the annulus, and will then be found, (so it has seemed to me) to present appearances either referable to the male, or female organ.

There are some other appearances more identifiable with as pistillary structure, but the parts are so mixed up with cellular growths, and the axis is so lobed, that I speak with some hesitation concerning these. *Occasionally* I have seen bi-lobed cellular bodies with a small obscure central nucleus, which correspond fairly with the received notions of carpellary structure, and in which, from the smallness of the nucleus or cavity, the formation would be towards the centre.

It appears to me contrary to all analogy to assume the ovuliform bodies to be young pistilla, because in all pistillary plants, the pistillum is formed first, the placenta and the productions from it, subsequently.

In Naias, if these be females, the development is reversed. There are many curious speculations arising from the examination of Naias, and if the ovuliform bodies be pistilla, the ovulum is evidently naked throughout its first periods of development.

If they are young females, the only explanation is, to consider the ovulum or nucleus as the direct continuation of the axis of the parent plants, but this will not explain the males, which are *never perhaps terminal bodies.*

[I have seen no gradation of development of the outer tunic, the transition from a completely formed stamen, to a very ru-

dimentary one, being sudden, the tunic approaches to the leaves in structure, the teeth at its apex being like those of the leaves fuscous, and thus hints that the disposition of the male flowers in both, may probably vary.]

Other bodies also are formed, which square with our pistillary theories, but a close examination shews that the centre is united to the lateral ones at unequal heights, hence I consider these 3-lobed bodies, as young summits of axis.

This however is not quite satisfactory, for the nucleus is as much developed as the lateral lobes.

5. *Naias seminuda* Gr. CCLVI.

1. But not a good figure, being too large, and the teeth conspicuous.
2. Fruit or nodus of the axis, 1 leaf shelters a female flower, the second the continuation of the axis, the third, a small branch.
3. Female flower and its leaf.
4. Portion of a leaf, in contrast with that of Naias.
5. Female flower and rudimentary leaf or spatha.
5a. Female flower, 5*b* *shews upper the conducting tissue*, 5*c* same separated.
6. Ovulum, at a rather early period.
7. Do. a little before fecundation.
8. Ovulum when fit for fecundation, 8*a* conducting tissue of footstalk or placenta.
10. Female after impregnation.
11. Long section of ovulum, through the testa of the same.
12. Nucleus of the same removed.
13. Upper ½ of nucleus and inner tegument.
14. Ovulum sometime after fecundation, 14*a* same : part of apex of inner tegument, and upper ½ of nucleus. Embryo just being developed.
15. More advanced, 15*a* same ½ testa longitudinally removed.

6. *Naias seminuda*, Gr. Pl. CCLIII.

1. Ovulum further advanced, upper parts of testa, and inner tegument removed, the extreme apex of inner tegument adhering to apex of nucleus.
2. Vertical of apex of nucleus, shews its radiated structure; the mammilla is due to apex of the inner tegument.
3. Apex of inner tegument separated almost entirely, a boyau is just seen passing it to apex of nucleus, at *a*.
4. 4*a*. Embryo separated, 4*b* funicle do. with an amorphous substance sticking to it: the last is not always seen.
5. Nearly ripe fruit, 6 nearly ripe seed ½ testa longitudinally removed.
7. Nucleus of do. base and apex of inner tegument remaining.
8. Embryo.
9. Young male, 9*a* do. opened by pressure, shews that the anther is enclosed in a bi-lobed tunic, or perianth.
10. More advanced, 11 more advanced, 11*a* apex of perianth separated, 12 males after dehiscence, perhaps only occasionally.
13. 13, Pollen.
14. Apex of an axis.
15. Portion of apex of an axis, *a* axis developing, *b* female flower; *e* male.
16. Portion of a ditto, young male and female? with a young leaf.
17. Four young flowers; which is the male, and which the female?.
18. Young female, 19, 20, 21 its stages of development 20*a* ovule of 20, 21*a* ovule 21.
22. Still younger female, 22*a* as seen under light pressure. These should have preceded *No.* 18.

ZANICHELLIA.

*Zanichelliæ** *sp.* Pls. CCLIV, CCLVI.

Planta immersa in aquis dulcibus proveniens in limo cæspetosa repens. Radiculæ fibrosæ ad nodos solitariæ.

Caulis *principarius* subterraneus sursum ramos emittens obscure dischotomos, cellulosos, ad nodum quemque vaginam folium et radicula plerumque solitaria.

Foliis alternis, linearibus, teneris planiusculis, ad sunt in axillis, setæ paucæ origine mihi omnino ignotæ.

Ad basin cujusque et interné folii adest vagina magna membranacea ochracea, a constant. folii e tubis binis, septo crasso separatis cellulosa sunt et omnino ecuticulosa et ideo estomatosa. Ex examinatione brevi omnino evasculosa exeunt, vasa (ductus) certo adsunt secus suturam dorsalem pistilli ad medum usque, cellulis quadratis materia globulosa veridia plus minus farctis vernatio recta.

Foliatio si flos adest magis composita. Adest enim flori cuique folium e vagina exsertum foliis cateris omnino similis. Si flos unius sexus folium unicum. Si flos masculus et inflorescentia fæminea adsunt, folia duo, adsunt neque hæc folia ad florem vere pertinent? quippe inter folium et florem (si masculum) adest membrana oblonga, planæ vaginæ struct similis.

Flores utriusque sexus e vagina folii externa primarii exsertatur vel separantur vel in eadem vagina.

Flos masculus e stamina unico evoluto et e membrana pro-spatham. Filamentum filiforme cellulosum, persistentius cum connectivo. Anthera magna adnata, bilocularis connectivo persistente apice ampliato loculorum parietibus demum *solubilibus,* cellulis e fibrosis, longitudinal. dehiscentibus, loculis subrevolatis. Pollen rotundatum, constans ut in Naiadibus omnibus, uti mihi videtur, e sacculo diaphano hialino simplici, massam e granulis inæqualibus congregatis sæpius majusculis continente. Dehiscentiam antheræ post

* Cat. Fl. Affganist, no. 383.

videntur aggregare in massam mucilaginosam. Stamen initio sessile demum cito filamento stipatum.

Flores fæminei aggregati 2-5, sæpius forsan 4. Spatha cellulosa membranacea, breve pedunculata, urceolata, vel e tubo cylindraceusculo ore subintegra.

The membranous spathoid body does not always appear to belong to the stamen, in some cases where both flowers occur together, it rather belongs to the female, does it always belong to the prolongation of the axis. ?

Flores breviter stipitati, stipite demum immulato, e pistillo nudo. Ovario oblongo ovato 1-loculare, ovulo unico antitropo tegminibus binis et nucles ordinario, pendulo ex apice internu loculi, et stylo crassiusculo ex ovarii apice attenuato. Stigma maximum albumen subhyalinum subcordatum.

Fructus compositus ex ovariis (unico sæpe abortiente) completis basi spathæ nunc mucilaginosæ, reliquis obsitus. Pedunculo deorsum curvatulo non elongato, pedicellisque vel stipitibus immulatis.

Carpella oblonga obliqua, secus placentæ suturam *incurva* secus latus oppositum *concurva*, sursum in stylum induratum. persistent. Stigmata nunc valde diminuta sphacelata obliqua terminalia indehiscentia ad latus convexum vel dorso rugosula, extus tenuiter cellulosum intus subdrupaceum, crispaque. Semen pendulum curvatulum subcylindraceum utrinque obtusum. Tegumen unicum e duobus tenuissimis ærretis, membranaceo-cellulosum. Micropyle in forma mammillæ minimæ apiculi, sed extrorsum spectans. Albumen o.

Embryo magnus seminis cavitatem implens. Radicula longa clavata apice incrassata et medio quasi cuspidata. Cotyledone longissimum subulatum incurvato induplicatum radicula fere duplo longius secus ejus latus internis applicitum triplicatum.

Plumula oblonga inclusa ad latus exterius baseos cotyledones diphylla, fissura parva, indistincte.

Hab. in aquis lene fluentibus dulcibus Quettah.

This is a curious plant, allied in some points, especially the

structure of the pistillum to Ruppia, it is among the lowest of the order i organisation. This same, or another species occurs at Dadur in ditches, but if the same it attains a larger size. The real situation of the flowers with respect to the leaves, setæ and spathoid membranes obscure, and will require more patient looking into than I can now give, and better means of observation than I possess at present.

The most curious part of the structure is the embryo, and especially the very long cotyledone, and the manner in which it is packed, analogous something to Nelumbuim, and to which extreme length and consequent induplication the first progress is presented by Ruppia itself.

The character of the genus may be thus stated.

Flores monoici, (sexus distincti vel aggregati) vaginis foliorum inclusis.

Mas. solitarius stamen unicum, nudum vel membranum oblonge plane stipatum ?

Fæm. 3-4 aggregata, pedunculo brevi immulato, tubo spathoideo semi-inclusa. Ovarium subsessile. Stigma maximum cordatum. Ovulum pendulum. Carpella vel capsula subsessilia oblonga subindurata, indehiscentia. Semen pendulum curvatum. Embryo radiculæ maxime clavata. Cotyledone subulato longissimo induplicato.

Herba immersa habitu et foliis Ruppiæ, floribus inconspicuis.

Further examination leads me to consider it doubtful that neither the male flower, or female is truly axillary, if so, the male is, and the female is not, and in that case the oblong spathoid body does not belong to the flowers of either sex, but is analogous or rather akin to the vaginiform sheath, which, as it is sometimes present without any leaf, is I think to be considered as a species of bud-scale, analogous to that of Dipterocarpeæ etc. In this view it is rudimentary; because the axis is not often elongated in more than one direction.

When two leaves exist, two scales should be present as is generally the case, and this intervening between the flower

and the leaf, to which the flower seems axillary, it may be considered that the flowers are really terminal, and that were the axis prolonged, each prolongation would be a branch axillary to each leaf.

Again in some cases where the scale is absent from either flower, and intervening between one of the leaves, which are almost invariably present (one to each flower) and the developed continuation of the axis, such continuation is to be considered as lateral, and belonging to the leaf, between which and the axis the scale intervenes. And in such a case the female flower is really terminal, that is, terminates, the axis most to the centre, the male flower somewhat less so, and the bud from the remaining leaf or that next the male flower is more or less developed, entirely so when the scale is absent.

The flowers are therefore terminal however much to the contrary they may seem, for in these dichotomous plants, as many forks should occur, as there are leaves, at or about one node; of the setæ, I know nothing more than I do of those of genuine Aroideæ.

What bears me out in the above, is, that careful examination will generally disclose a young bud, obviously belonging to the scale which intervenes between it and its leaf, and that this scale when of any development, will be found to enclose at the extreme base, the actual elongation of the axis.

This latter observation may however be wrong, because the vagina belongs to this actual elongation, especially as the connection between the scales and the leaves is evident.

Supplementary sketches Pl. CCLVI. Fig. I.

I, represents a node and the inflorescence; at *a* the vagina laid open; at *b* the primary leaf, from the axilla of which the convolute bud-scale, or vagina is evolved, which again belongs to the actual elongation of the axis; at *c* is this actual elongation of axis; at *d* a supplementary leaf; at *e* its scale; at *f* its bud; at *h* the stamen; at *i* the second supple-

mentary leaf; at *k* its sheath, also bearing the rudiment of a bud; at *l* the female inflorescence, always most central. This figure also shews the dehiscence of the stamen, and the way the sheath is occupied partly by pollen.

The exsertion of the stigmata by actual rupture of the vagina is a curious point, and one to which I have not attended at fig. 2, the same, stamen detached.

2, *a* represents the outermost or primary leaf, b the vagina, *c* the elongation of the axis, *d* the single supplementary leaf, *e* its scale, *f* the male flower.

At 3, the same, the supplementary leaf of female not shewn, the same figures have the same references.

At 4, *a* outer leaf, *b* sheath, *c* elongation of axis, *d* one supplementary leaf, *e* sheath, *f* anthers, *g* second supplementary leaf, *h* its leaf, *i* female inflorescence.

At 5, Young ovule.

Zanichellia continued Pl. CCLV.

1. Plant natural size.
2. Portion of flowering branch; at *a* the primary leaf of the node; *b* the sheath, or bud-scale protecting the prolongation of the axis, seen at B.—*c* one supplementary leaf, *d* bud scale of its bud, *e* stamen, *f* second supplementary leaf; at *g* its bud-scale; *h* female inflorescence, this at the epoch of maturity.

At the lower node the same letters have similar references, but only the male flower is developed the solution of the cells of the anther, and the persistent and elongated filament are shewn.

3. Outer leaf and sheath removed; at *a* sheath of leaf, *h* nearest the female flowers, at *d* sheath of leaf, *e* nearest the male flower, at *f* setæ, at *g* bud of scale *d*, at *c* male flower, at *b* female flowers.
4. A supplementary leaf with its sheath which embraces the stamen as if it had a tendency to become a spatha.

5. A primary leaf of node, *b* sheath or bud-scale of prolongation of axis, *c* supplementary leaf, or rather leaf of one dichotomy not yet developed, *d* its bud-scale, *e* male flower, *f* setæ.

7. Portion of endothecum shewing that it has no fibrous cells, yet it dehisces *more proprio*. The different direction of the cells of endothecum and exothecum is quite sufficient to account for dehiscence.

8. Pollen dry, 8 *a* in water.

6. Male flower near dehiscence, setæ surrounding base of filament.

9. Stamen or male flower sometime after it has performed, its functions, the cells appear to dissolve, the pollen coheres slightly into a sub-mucilaginous substance.

10 Female inflorescence in the spatha or involucra is first developed, but do not close even at a tolerably early period.

11. Pistillum, 12. Do. long section.

13. Ovulum. 13. *a* Do. long section.

14. Young fruits. 14 *a* one formed of testa, inner tegument, and nucleary, all combined into one, and separately scarcely demonstrable.

14*b*. its seed, *a* outer coat, *b* embryonary sac, *c* funicle large as in others of the family, *d* embryo, *e* foramen ; 14 *c* embryo separated, *a* radicle, *b* cotyledone, *c* plumule, ½ exserted, 15 mature carpella long se ction.

15. Seed, *a* micropyle.

15*b*. Embryo as it is in the seed, 15*c* Do. seed, tegument halved, the nucleary coat is still demonstrable but the embryonary scarcely so.

16. Embryo as it is folded up in the seed, 16 Do. cotyledone, displaced, 16 Do. front view, the fissure at apex of radicle is imaginary.

17. Seed less developed, 17*a* its embryo, situation of plumule at *a* very distin ct.

Zanichellia continued Pl, CCLVI. Fig. II.

1. Young Carpella ; 2 its ovulum, *a* foramen, *b* testa, *c* embryonary sac, or nucleus lined by that sac, *d* funicle, *e* embryo. 3 embryo detached.
4. More advanced ovule, the same figures have the same references, embryonary sac more distinct, but scarcely demonstrable. 5 embryo.
6. Half matured, the same figures have the same references,
7. embryo.
8. More advanced :
9. Embryo, at *a* Plumulæ situs.
10. Complete embryo, 10 *a* Do. fronts view, 10*b* Do. long section, shewing the 2 leaved plumule.

RUPPIA.

Ruppiæ sp. CCLVII. Planta aquatica in massis intricatis, gracilis, fucoidea, dichotoma.

Folia cylindraceo-planiuscula e basi dilatata longe attenuata, acutato-cuspidata pallide viridescentia. Structura, e canaliculis 2, initio septis transversis interruptis septo longitudinale centrale interposito.

Axillæ, folia alia gignunt bina ? vel una quorum interius junius in parte inferne membrana stipulacea involvitur.

Spadix terminalis e partibus dilatatus fol. 2 terminal. subopposita vix exserta, subclavata 2-4 linealis.

Spatha plana spathulata *structura vaginarum* apice plerumque denticulata.

Flores in spadici sessiles, numero semper 2, inconspicui omnino nudi.

Stamina 4 in spadice sæpius transverse sita, brunnescentis.

Antheræ sessiles oblongi uniloculares rima centrali quoad axin : transversa dehiscentes cellulæ fibrosæ sub o.

Pollen singulari forma, magnum oblongum curvatum, subreniforme e vesiculo e plicato, e perforato translucido globulos

majusculos (fovillam) includens, apicibus interdum constrictis.

Ovaria 4 subsessilis cum antheris alternant. oblonga, glabra Stylus nullus. Stigma discoid, magnum. Ovulum unicum, hinc oblique gibbosum subsessile, foramen apicale, tegument cellulosa exterius laxum. Spad. pedunculus demum paullo elongatus rectus.

Capsula ovata in apicem pedicelli albi subclavati fere uncialis; apice stigmati coronata parietes cellulosa. Pyrena tenuia, conforme, nigram osseam apice attenuata in corpore styliforme acuto stigmata attingens, epicarpium solubile erectum, secus faceum internam sulca lanceolata notat.

Parietes ejus crassi sunt spongiosi, et cavitatibus parvis excavati.

Semen pendulum albumen : tegument exterius laxum cellulosum interius simili sed tenuius foramine laterali!

Embryo conforme carnosus, e radicula maxime crassissimus aspectu albuminis, obtusissimus, apicem geometricam seminis oblonga spectans. Cotyledone cylindraceus parvus, in basi radicis incumbens. Plumula inclusa, minima, in basis hujus, fissura minima e rumpens.

I have not met with specimens in a state sufficient to warrant me in forming any conclusion as to the fact of the nucleus changing its position or not.

Ruppia appears to me to be a cellular plant, the stem consists of a central bundle of longitudinal tissue, and the space between this and the circumference is occupied by air cells of the usual formation, I have not been able to trace the existence of any vessels.

The division of the axis is dichotomous, an arrangement which pervades throughout the lower orders of vegetables, and which would seem to mark this as a transition from flowering to flowerless plants.

The leaves consist of two tubes, separated by a septum which occupies the centre, a similar structure exists in some other aquatic plants.

The spadix is always terminal and the two uppermost leaves are so approximated as to appear opposite. The axilla of each leaf bears a bud consisting generally of leaves, but occasionally of a branch of the axis.

In this last case, it is furnished with a sheath, in the former, the inner leaf is always similarly provided. The spatha is of similar structure and possibly of a similar origin, it never even in very young stages protects the spadix, although its margins are curved in this direction. Although not evidently belonging to the peduncle of the spatha, yet as it always exists, and is never folded round the leaf or the ramification of the axis, I am disposed to consider it as being a true spatha.

The flowers are of very simple conformation, consisting of 4 anthers, and 4 alternating ovaries, the disposition is always alternate, and the number limited to two. In the pollen I have not yet ascertained the existence of any fold or pore, or an indication of the existence of an inner membrane. In the appearance of this structure and the large size of the contained granules, it agrees entirely with Naias and Ceratophyllum, and with some very widely different Dicotyledonous plants, such as Sarcocodon, all of which are immediately allied with Rafflesiaceæ.

I have seen that the radicle presents a marked deviation from its usual relations with the coats of the ovulum. Before impregnation, which appears to be of very general occurrence, the foramen of the coats of the ovulum is situated at the apex of the seed, and to this the apex of the nucleus, strictly corresponds. In the mature seed the foramen will be found somewhat above the centre of the outer face of the seed on which it presents a mammillar appearance.

The change in the direction of this occurs very rapidly, and at the time when it is quite completed, the radicle will be found developed at the geometrical apex.

Whether this change is accompanied by the usual corresponding change in the nucleus I cannot state from demons-

tration, for the nucleus presents none of those indications by which its apex is in most other ovula or seeds so easily recognised, on the contrary, its surface is homogeneous and equal throughout. But it may be inferred that it does not; for although one instance has been adduced in which the radicle does not correspond to the opening in the teguments, I know of none in which it does not correspond to the apex of the nucleus, for even in cases where it is formed externally to the nucleus, it agrees in direction with this body.

The ovulum has I think otherwise the ordinary structure, differing only in the very large size of the cell from which the embryo is developed, and to which, under some modification or another it is always attached. In supposing this globular body to be the footstalk of the embryo, I am guided entirely by analogy, for I have not been able to separate the embryonary sac, which I consider to occupy closely the more transparent part of the young seed. Of such extreme tenuity and intimate adherence, examples are by no means wanting, but it would be contray to all analogy to assume that the embryo is formed outside the embryonary sac. The direction of the young radicle does not appear to be otherwise constant, that it is not always in the axis of the ovulum, but is generally inclined to one side or other. I thought at one time that it was generally inclined to the foramen, but I am not disposed to say that it is constantly so, indeed the cavity of the embryonary sac is so large, and its contents so aqueous that very slight pressure necessarily consequent on dissection may cause a change.

The cotyledone is not tardy in making its appearance, its direction is oblique with regard to the radicle, and it assumes its subsequent recumbent position owing to the resistance its meets on its reaching the upper part of the cavity of the sac; and when the embryo is half developed, the existence of the plumule may likewise be ascertained.

The radicle always maintains its original direction which is that of the ovulum before impregnation. That part of

its base which is contiguous to the foramen is more transparent than the rest, and is somewhat conical, and this appears to be considered by Hooker as the radicle.

Examination of germinating specimens can only clear up which part of this immense radicle first germinates. All analogy would teach us that its true apex is the first part that undergoes any change. And the resistance of the drupe being overcome, that of the coats of the seed is small so that there is but little ground for assuming that any extraordinary change in this respect would occur. The change in the direction of part of the seed is in accordance with the structure of the order? Ruppia is I believe a new addition to the Flora of India, and it is an additional instance of the fact that the flora even of Calcutta, is by no means exhausted.

Of the fourteen genera of this family enumerated in Lindley's Introduction. India possesses, Caullinia, Naias, Potamageton, Zanichellia and Ruppia. To these are to be added Ceratophyllum, Potamogeton is the most perfect in number of parts, and of species.

It belongs to an order in which the extremes of geographical distribution occurs. Whether this depends on the habits of the plants, or on their low organisation, (shewn by their comparatively small number of species,) remains to be shewn. It is a curious thing that some of the species are decidedly marine plants, thus forming an obvious approach to Algæ, as Thalassia marina, Zostera, Cymodora, Posidonia.

Ruppia, Pl. CCLVIII.

1'. Spadix, and the termination of axis.
2'. Same more enlarged, leaves spread out, *a* spatha.
3. Spadix detached.
4. Back view of anther.
5. Lateral ditto $\frac{1}{800}$.
6,6. Pollen. 6*a*, burst by pressure $\frac{1}{800}$. 6 *b*, *fovilla.*
7. Inner of anther, shewing the rudimentary fibres of cells.

8. Carpellum. 8*a* inner face, *shewing* the suture, 8*b* long section. 8*c* Ovule. 8*d* long section.
9. Spadix after impregnation; ovaria variously enlarged, some remain unchanged.
11. More advanced, embryo very oblique.

Ruppia CCLVII.

1. Plant natural size.
2. Young spadix sometime before exsertion.
3. Very young spadix, shewing incomplete involution of spatha.
4. More advanced; *a*, spatha; *b*, outer leaf of axilla; *c*, inner ditto always provided with a sheath; *a, c, sheath*; *d*, outer leaf of opposite axilla without one; o marks of exsertion of perigonial leaves.
5. Spadix, 8 spatha young.
6. Ditto nearly mature.

Ruppia, Pl. CCLIX.

1'. Ovule before impregnation, 1 testa, 2 tegumen, 3 foramen, 4 cavity excavated in nucleus, 5 hilum.
2'. Ovule after impregnation, 1 teguments, 2 foramen; both teguments here seen, but no mammilla of nucleus which presents a rounded uniform margin.
3'. Ovule more advanced, foramen very lateral.
4'. More advanced, 4*a* Foramen viewed in front.
5'. Ovule more advanced, 1 hilum, 2 foramen mammillæ of both teguments seen but none of nucleus, 3 testa, 4 tegument, 5 nucleus, lined and rendered turged by embryonary sac, 6 globular cell attaching the embryo, 7 embryo.
6'. More advanced, same figures have same references, 8 commencement of cotyledon.
7'. More advanced, same references, 9 projection shewing situation of plumula.

7'*a*. 1 apex of embryonary sac and nucleus, 2 attaching cell of embryo, 3 radicle, 4 cotyledon, 5 site of plumula.

8'. At a rather earlier period, teguments partly detached shewing at same figures the foramen, the radiated structure there of the integuments, the uniformly rounded surface of the nucleus.

9'. More advanced than 7', 1 hilum; 2, 2 foramen both teguments here mammillar, 3-nucleus and embryonary sac, 4 stalk of embryo, 5 embryo.

9*a*. Embryo of do. 1 radicle and its attachment, 2 cotyledon, 3 plumula.

10. Section of young fruit, drupaceous part commencing.

10*a*. Ovule of do. 1 hilum, 2, 2 foramen, 3 nucleus, 4 embryonary sac, 5 stalk of embryo, 6 embryo.

11. Much more advanced, drupaceous coat nearly perfect, *a* its styliform apex.

11*a*. Ovule of do. 1 hilum, 2, 2 foramen both mammillæ still discernible, 3 embryonary sac now having almost obliterated the nucleus, 4 embryo.

11*b*. Embryo of same, same references as 9*a*.

12. Fruit laid open, shewing the sutura in the drupe.

12*a*. Long section of do. *a* pericarp, *b* drupaceous coat, *c* teguments of seed, *d* embryo, *e* recumbent cotyledon, *f* situation of plumula.

12*b*. Lateral view of embryo.

12*c*. View of its front which is next the foraminal side, *a* conical process dentiform near foramen, *b* chink for *emission* of plumula.

12*d*. Long section, at *a* plumula seen.

12*e*. Same under pressure.

Spathium.

Mr. Edgeworth had about the same time, or very probably previously, to the foregoing observations, come to the same conclusion with myself regarding the embryo of this genus, but he had pushed his enquiries much farther, and had ascertain-

ed remarkable differences between *Spathium monostachyum* and *S. undulatum*, in which the plumule is highly developed and lodged in the bosom of a fleshy foliaceous *involute* cotyledon, a remarkable circumstance in monocotyledonous embryos.

Mr. Edgeworth has likewise pointed out curious differences between the two plants, in the submerged pluvceous habit of *S. undulatum*, and its persistent bracts, to which may be added some difference in the pollen, so that my friend is inclined to consider it as worth ranking distinctly under the name Limnogeton.

APONOGETON.

Aponogeton monostachyum. Stoloniferum. Carpella alba ventricoso-inflata cellulosa, demum spontanea in farina solubilia. Stylo rostrato.

Semina pauca ascendentia, oblonga, cellulosa viridia 6-8 costata, hilo indistincte, foramine hiloque propinquis, annulo circumcinctis.

Embryo orthotropis, viridescens, radicula brevi albida, plumula albida inclusa fere omnino.

Testa laxa simplice striata. Tegument interius embryonam ? apice mammillatam e striatis vel exterius cellulis, interium quasi mucilaginos.

Stomata upper surface in vast abundance to be seen in all stages, open or shut, when shut, the disc is linear opaque, when open the disc is oval with irregular opaque margins. *Serampore Oct. 28th,* 1841.

JUNCAGINACEÆ.

Triglochin.

Planta Herbacea. Perennio. Rhizomato subterraneo repente basi foliorum reliquus membranaceis vestit.

Fol. distichis vix equitantibus e basi canaliculata vaginanta margine membranacea, subulata, superne-plana medioque sulcata, dorso convexa, margo membranaceus ultra petiolum vel basin productus, in quasi ligulam e lobis 2 rotundatis.

Spica axillaris, subteres glaber ut tota planta, nudaque, alabastris apice dense congestis tectis demum elongata.

Flores inconspicui, erecti, distantiusculi, in pedicellis gracilibus, virides.

Perianth. e seriebus binis sepalorum concavorum inferna serie *e basi reflexa*, sepalis deciduis, exterioribus citius.

Stamina sessilia in sinubus petiolorum, series inferioris basi reflexa sepalorum fere semi-amplexa. Antheræ magnæ biloculares, longitudinaliter dehiscentes cum sepalis deciduis. Pollen magnum, inæquale, oblongo-rotundum granulis magnis repletum.

Ovarium 3-sulcatum obtuse 3-gonum, sulcis inter angulos.

Pistillum oblongo-clavatum 3-loculare, loculis ovulum unicum, ascendens, foramen hilum (prope like the neck of a bottle) raphe conspicua introrsus continentibus. Inter loculos 3 alios abortivos, solidos, (sulcos). Stylus nullus. Stigma (processus) fimbriæ plurimæ cellulosæ ex ambito toto apicis pistilli.

Fructus erecti, axi approximati, pedicellis immutatis, nudi, clavati, induratiusculi. Stigmata marcesco terminate, Capsula 3-locularis, costis interjectis inter loculos et ab his discretis, fibrosis (loculis abortivis more Orchidearum).

Semen unum loculo cuique erectum situ ovuli lineari subteres. Tegument exterius viridi tinctum præsertim raphei

secus et ad chalazam apicalem conspicuam subcarinatam, tenue membranaceum. Collo foramenis (foraminque) longo conspicuo. Tegum. interius tenua e membrano ovuli secunda, testa collum et foramen conforme. Albumen o. Embryo semini conforme. Cotyledone maximus. Radicula fissura inconspecue, subconica brevissima ad hilum. Plumula inclusa. *Simplex ?* e.

Hab. Nookhloor, Ghaznee and Cabul. Odor fœtid.

It is a curious plant, coming near Acoroideæ or Fluviales, at least Naiades are to be considered as Triglochins reduced to one anther and one carpellary leaf.

From the complete separation of the fertile from the barren carpella, we may expect complete separation of these bodies. Indeed there is such a tendency to separation in all the envelopes, and they appear so very distinct, that we may also meet with a plant in which all the whorls are dislocated. In this tendency it obviously approaches Aroideæ. In its ovule it has a close relation to Naias, which has them erect not pendulous, as Lindley states the whole order to have. This a much more developed plant than most of the Naiades, which require subdivision. The large size of the anthers of these imperfect aquatic plants is curious, as well as the structure of their pollen. The situation of the fertile carpella is curious and shews that these have an inverse tendency to ordinary growth, inverse to that if the stamina which diminish inwards, these again approach to Aroideæ, the bodies interposed between males and females being barren, the lower are more like stamina and the upper like carpella, so that the order of growth in such plants is precisely as it is in this

Pl. CCLXXI.

1. Plants nat. size.
2. Young bud, anterior; 2*a* do. posterior.
3. Stamens of do. front and back view.
4. Alabastrum more advanced, 4 an inferior sepal, and its stamina viewed laterally, 4*b* same viewed behind.

5. More advanced. Lower sepal and stamina, behind.
6. Flower; *6a* do. more advanced, anterior lower sepal removed to shew the dehiscence of the anthers.
7. Pollen, dry 8, *8a* do. immersed in water.
9. Pistillum, the two lower sepals partly removed, and one upper one remaining with its anthers, one cell opened longitudinally shewing the situation of the ovule, and its direction.

9a. Ovule laterally, *9b* in front, 10 long section.

11. Transverse of ovary, *a* ovuliferous portion.
12. Do. more towards the apex.
13. Fruit.
14. Do. long section thro' one fertile and one barren cell.
15. Transverse of Do. shewing that the fertile cells are separate from the others, one cell having already separated at *a*.
16. Seed. Back and side view.
17. Seed, long section, *a* outer tegument, *b* inner, *c* cotyledon, *d* radicle, *e* Plumula, *f* foramina, *g* raphe, *h* chalaza.
18. Embryo separated, 18 *a* long section of the same.
19. Base of Embryo *a* front shewing the slit, 19 *a* do. slit laid open.
20. Plumula detached, under $\frac{1}{16}$. it appears simple.

LEMNACEÆ.

General Remarks.

The diagnostic character of the genus Lemna as given by Achille Richard appears to me, if I may venture an opinion, to display a want of precision. For not only are parts assumed to be annalogous to other parts of other vegetables, such as—Herbæ acaules sæpius triplyllæ, *subtus radicantes*! —Flores e fissure marginali foliorum orte, *minimi*;—but characters of very minor importance are also admitted, such as—spatha compressa reticulata pelucida.—Stamina spatha lon-

giora: filamentis teretibus crassis; loculis globosis discretis; sulco dehiscentibus;—-Ovarium subrotundo-compressum. Stylus teres etc. etc.,

M. Richard says, that the genus is certainly exalbuminous, yet I find traces of the existance of albumen.

The axis of these plants is doubtless the line from which the fronds and flowers spring, and always on opposite sides. Although after maturation of the seeds, either side may produce fronds. This axis always has a tendency to elongate, and in some cases actually produces fronds: which have been hence called petioled.

The spatha is a leaf bearing in its axilla the flowers: it is absent, as might be expected in Grantia in which the flower is centrical and terminating the axis.

Caulescent and leafly Lemnaceæ may therefore be expected, and the essence of the order is a nakedness of flowers, hypogynous stamina and peculiar conformation of the seed.

The greatest objection to my view is, that in all other cases known to me; the growth of the plumule is in an opposite direction to that of the radicle.

This direction is reverted to however in the development of the primordial frond.

The figures of L. C. Richard leave but little to be desired, as they afford an excellent instance of the proper mode of botanical drawings.

The observations of Richard differ from those of Wilson, in his supposing that the cotyledon (radicle) is undivided, that hence the plumule makes it exist by laceration, and lastly that the radicle of the plumule pierces through the *lower or whiter* side of the cotyledon.

It would rather appear that the cotyledon becomes subsequently liberated from the seed, and in this state it has a marked resemblance to the radicle.

The dichotomy must be examined for when the terminal frond is developed it should be so before to lateral ones.

The remarkable genus Spathacarpa may? in another view

be considered as having no other spatha than the leaf, itself? It approaches in what is considered its spadix to Pistia.

The central situation of the stamina contrasted with the lateral one of the pistilla invalidates the idea of the stamina being lateral developments?

Wilson's Scutellum is the apex of the nucleus, so curiously modified. The three coats mentioned by him amount probably to only two, the scutellum itself or its radiated portion being continuous with the reticulate portion, which formed originally the *cuticle*? of the nucleus, the inner membranous one forming the apex of the embryonary sac.

The separation of the scutellum depends evidently upon the force exerted on it by the growing embryo, and its covering its radicle like a cup, depends on the direction of the first growth of this coinciding itself with the axis of the inner membrane, as well as upon its adhesion with the inner membrane very equally throughout.

The perforation of the lower lip of the cotyledon, (radicle) by the root of the developing plumule is very curious; it is represented both by Wilson and Richard. It is due probably to some sufficient obstacle to its escape by the fissure; because this is its mode of existence in the innovations, otherwise, in these also it should pierce the lower lip of the figure.

Another argument in favour is, that it does not furnish a sheath to the radicle.

Mr. Wilson thinks that the secutellum is destined to protect the embryo from injury while breaking through the external coat of the seed, it is necessary to look to this.

The constancy with which the secutellum adheres to the lower lip of the fissure is remarkable, it points out a certain laterality in the exit of the plumula, a circumstance of some importance, because its adhesion is not of such extent as would authorise is to suppose it is the cause of this, neither would it be so permanent.

In these figures there is an obvious defect, for the lower

lip is not represented as distinct from the plumule, see *pl.* 6. 11. 13.

Calla differs from Acorus in this, that the perianth is converted into stamena, to this there is a considerable tendency in Acorus itself.

I consider the objection which might be raised to my regarding it the radicle on account of the direction of the plumule, weakened by the direction which this assumes in most Aroideæ.

It should not be forgotton either, that a section of the seed accords entirely with that of Monocotyledons, and were it not that the subsequent evolution indicates so plainly the nature of the part, we might consider the plumule as the radicle, and the gemmæ as the plumule, the chief difference consisting in the radicle being already distinct.

Stomata appear to have been known to L. C. Richard who describes fronds as minutissima creberrimeque porulosa on their upper surface.

The origin of the parts has been accurately described by Richard. In describing the roots he makes out that their direction depends on the gibbosity of the frond, and hence it may be inferred were it not for this, that the root would have an opposite direction to the axis itself.

It would be desirable to examine whether young fronds are opposite, or whether the spathe is opposite to the frond, as well as to its relation with the frondule of the same side, and why are roots fascicled in some.

Neither Pistia nor Lemna agree with the character of the order as given by Dr. Lindley in his Introduction. As Pistia has evidently a much higher, as well as a much more distinct organisation than Lemna, it must either form the base of a distinct group, or revert to its original station, in Aroideæ, from which it does not differ in any more essential particular than the absence of a lateral *slit* for the *emission* of the plumule.

Pistia agrees with some Aroideæ, as Spathicarpa, in the

attachments of the flowers to the spatha a structure which will only be explained by a gradation of intermediate structures.*

It is easily explained by an assumption of the adherence of the spadix to the midrib of the spatha. And this is the more natural, both from analogy and because from the structure of the peduncle it is evident that in Aroideæ it is itself an axis, of which the spadix is the continuation. In Pothinæ this is most obvious; in Acoroideæ again it is less so.

It agrees with them in the composition of its ovary, and with many ovula of the order.

It differs in lower organisation, in the cup surrounding the pedicel of the male flowers, (which is obviously a higher development of the intermediate body,) and above all, in its germination.

The sheaths of the radicles of the roots have the same origin as those of Lemna, and is derived from the central tissue, the outer tissue being of course perforated, but the sheath derived from this never exceeds the size of a cap, and is deciduous.

From the lowest plants of Aroideæ the circle of natural affinities would pass through Pistia, and close by Lemnaceæ, in which the hypogynous structure of Pothos etc. is reverted to.

In organs of aëration Pistia differs but little from ordinary Aroideæ. There is perhaps a tendency to the usually precise regularity of axillary development of buds, like others Aroideæ, the buds are enclosed membranous.

* *Pistia stratiolis.* This plant is much more developed than Lemna, with which it can scarcely be associated. It throws a good deal of light on the nature of the spatha of Aroidea, the lamina of which evidently belongs to the peduncle of the spadix. It affords a beautiful instance of the uniformity of nature, the green body situated between the female flower, and the male representing the abortive ones of such common occurrence in the order

The leaves are well developed but deficient in stomata the place of which is supplied by jointed lax hairs, with which both sides are covered, those of the under side being most developed but perhaps less frequent, the vernation is plicately conduplicate. Instead of being evascular, it is highly vascular, especially the axis.

Altogether I know of no peculiarity in its structure except the want of stomata, which is remarkable considering that the leaves are aëreal and the green matter well developed.

The venation is reticulate as in many Aroideæ, and the vessels are disposed in 3 or 4 layers, the primary fascicles at some distance from each other, and placed on the same line, see section of *Carinæ*.

Pistia stratiotes CCLX. Fig. I.

a. Spatha just opening, laterally viewed.
b. Do., in front. *a* stigma, female fissure opens first.
c. Do., long section. *a* pistillum, *b* intermediate gland, *c* cyathiform gland of male, *d* column of male flowers.
d. Male flower in a young state.
  d a, an anther from ditto.
e. Male flower of *c e a*, same viewed laterally; *e b*, another of do.; *e c*, transverse section of do.
f. Anthers, after dehiscence.
g. Pollen.
h. Portion of placenta and ovule of young ovary; *a* testa, *b* tegmen; *b a*, line indicating its composition. *c* nucleus; *d* opaque aereferous tissue of base of ovulum; *e* vascular supply: *p a*, tegmen and nucleus of second ovule.

Pistia stratiotes continued CCLXI.

A. Long section of spadix and spathe, after dehiscence of the anthers.

B. Front view of do.

C. Ovule of ditto, *a* testa, *b* opaque tissue at its base, *c* vessels, *d* tegmen, *e* nucleus.

D. Same, testa removed, *a* tegumen, *b* line of composition ? *c* foramenal canal, *d* nucleus.

E. Do., (younger) bundles of raphides very common in placental tissue.

F. Same, under pressure.

H. Very young ovule, *a* testa, *b* tegmen, *c* nucleus.

H 1. Same under pressure, the same letters have the same references, at *d* line of composition.

H. 2. Nucleus of do., separated.

G. Ovule more advanced from same placenta, nucleus inclosed.

G. a. Do., rather less developed.

Pistia stratiotes continued Pl. CCLX. Fig. II.

1. and 2. nearly mature fruit, remains of spatha removed.
3. Seed nearly ripe, *a* funicle.
4. Apex of do.
5. Long section of do. *a* testa, *b* membranous tegmen, *c* its concealed apex, coveřed by the rather thin testa, *d* albumen, *e* embryo.
6. Albumen removed. 6*a*, its apex, marked with two discs and a central areola which corresponds to the radicle of the embryo; the inner disc may represent the attachment of the embryonary sac, the outer that of the cl ea ry membrane, both being ragged.
7. Long section of tegmen, *a* funicle, *b* tegmen, *c* its nu-apex, *d* album. *e* embryo.
8. Embryo in a younger state, shewing the lateral fissure now large, *a* plumule.
9. Same more advanced, *a* plumule.

9*a* Long section of same, *a* site of fissure, *b* plumule.

10. Same more advanced, fissure closed and *more elevated.*

10*a* Same, embryo viewed on its contrary face.

Brongniart's account of Lemna appears to me correct, but of what nature the canal is, is another affair. The seed certainly has much more the appearance of a dicotyledonous, than monocotyledonous plant. Pressureat least makes it a perfect dicotyledonous one. Nor must we forget the opposition of the plumula to the radicle, which appears to me unusually monocotyledonous.

Not the least curious point is the attachment of the seed by a process obviously of its own substance.

If it be dicotyledonous, the division of the cotyledons appear later in it than any other plant I know. And in this it will again approach Monocotyledons.

The end of embryonary sac next to the apex of the nucleus is minutely apiculate.

There is no trace whatever of the canal when the embryo is half developed; at a period when the radicle is of considerable size, and completely enclosed by the auricles of the cotyledon, it is *continuous* with the plumule, which is very minute. Mr. Brongniart does not allude to, nor does he represent the peculiarity of the mammelliform apex of the nucleus neither does he mention the precise origin of the scutella or opercalum. According to the section given by him, the seed is really docotyledonous.

I have not been able to determine the canal communicating with the plumule, nor have I found that the plumule or Brongniart's radicle, is so far disconnected with them as he represents.

The development of the ovule is a fatal objection to considerig the plumule as the radicle. Nor must its absolute distinctness from the inclosing mass be overlooked. This plumule undergoes the same evolution within the embryo, as the young innovations do within the fronds. If my idea is right, it follows that in all, the 1st frondule will be terminal, although this would not seem to be the case from Richard's drawing Æ. Brongniart's explanation is, that the body enclosed within the thick end of the embryo, next the

apex of the nucleus, is radicle, and the small body at its base the gemmule, the cotyledon encloses the radicle by means of two processes, so far all is clear. Not so however when he explains Richard's drawing. He says the first part that issues is radicle, consequently he makes the bifid end of the cotyledon the radicle. He then points out that the body which issues from between these is the gemmule !

He is not decided as to what becomes of the radicle, for he says the radicle, or a secondary one, elongates itself on the sides of the opercule, can the young frondule be the part which is elongated into a radicle. I think not, or if it is, the sheath is derived from the cotyledon lip of Wilson, which he says is not the case, If we look at those orders which contain frondose plants we shall find that the number is, one to each kingdom.

Podostemeæ among Dicotyledons, Lemnaceæ, among Monocotyledons, with the exception of this, the two orders have but little in common. It is somewhat remarkable that the passage of Dicotyledons into Acotyledons, through the vegetative organs of Podostemon, is much more perfect than that of Monocot's through Lemna.

It is more especially to the lower forms of Hepaticæ that Podostemon has its relation, it will be necessary to ascertain whether the flower literally *breaks out*, as well as the young frond.

M. Adr. Jussieu states that the embryo of Lemna is composed of an ovoid radicula and gemmule, united along their axes by a farinaceous body, which, se dilatant autour d'elles dans tous les sens, se prolonge en bas jusqu'au niveau inférieur de la radicule, ex haut beaucoup au-dessus de la gem mule qu'il ne laisse en communication avec l'exterieur que par un vide ou canal central.

This farinaceous mass, which forms almost the entire mass of the embryo, ought naturally to be called the cotyledon, since the analogous body in a Zosteracea is so called.

M. Jussieu considers the fronds as the branches of an ap-

hyllous plant. Or, peut-on admettre une feuille cotylédonaire aussi développée dans un végétal du reste dépourvu defeuilles, et n'est-il pas plus rationnel de reconnaitre encone ici un developpement de la tigelle ?

Vide Comptes Rendus 1, juillet 1839. Aponogeton being referred in this paper to Monocotyledons.

Lemna.

Frondes sæpius proliferæ viridi-lutescentes, diametro longitudinali vix lineales, transversa subsemi-linealis oblongæ vel oblongo-obovatæ margine albæ, hinc obsoliti-emarginata, ellinc oppositæ intro marginaliter dente obsoleto conico.

Consistentia laxa. Pagina supera planiuscula stomatosa Radicula solitaria! fere capillaris longissime caliptrata demum nuda e pagina inferæ puncto florigero opposito erumpent. Frons novella flori opposita, e margine convexa exserta, flos e margine apposito qui obsolito concava. Spatha membranacea supra aperta, subinclusa.

Stam. 1, si 2, irregualiter evolutæ; unilateralia infera quoad paginam superum. Filamentum subcylindricum crassum cellolosum. Anthera bilocularis, loculis transverse dehiscent. Pollen globosum læve, simplex? Ovarium subrotundum superum attenuatum in stylo longiusculo cylindrico.

Stigma cyathiforma, distinctione structuræ nulla. Ovulum solitarium ad latus baseos affix. erectum. Testa cellulosa apice aperta nucleus ad epocum dehiscentiæ antheræ fere semi-exserti, cellulosa, *earlier* fere inclusa.

Semen oblongum subirregulariter pluribus costatum, apice mammillatum. Testa crassa, celluloso-spongiosa vel spongioso-farinacea, cellulis transversis, micropyle indistinctis. Raphe brevis, chalaza inconspicua membrana interne nucleare tenuissima albumen parcum vestiens, apice mammilla brunnescente donat.

Embryo axilis ratione seminis magnus, inversus, oblongo, obclavato. Radicula crassa subsphærica plumula magnum includens, cotyledone oblonga inclusa.

In the development of the seed it agrees well with Grantia to which it likewise approaches in the sub-antitropism of the ovula. As far as I have hitherto examined, I find the apex of the nucleus becomes separable and resembles strongly that of Grantia. The embryo is similar, and the plantule has similar relations. Seed is developed in this much more frequently than in the other species.

I believe the embryo to be solid, there is certainly an appearance of a fissure at the radicular end when it is viewed as an opaque object, but I imagine this is due to the bulging out of the plumula. There is I think no canal in the cotyledon, although on pressure there is an appearance of it in immature embryos, this may arise from less development there, all development being centripetal.

1. *Lemna minor.* Oblongis frondibus (at one end provided with an intromarginal conical process,) e striatis. Radicula solitaria.

HAB. In aquis stagnantibus circa Calcuttam.

OBS. Frons pallida, supra celluloso aspectu, subtus viridis, diametris 1½ linea. Pollen glabrum. Ovulum solitarium, hilo fere basilari.

2. *Lemna major.*

Frondibus oblongis, orbicularibus, sæpe subreniformibus supra lucidis striatisque. Radiculis pluribus.

In aquis stagnantibus. Multoties major, saturate viridis, subtus purpurascens, diametris maturis 3-2 lineis pluries prolifera. Pollen hispid. Stylus breviusculus.

At an early stage, when the anthers are nearly sessile, these organs will be found to consist of the usual number of parts, which have the usual disposition, *see figs.* male column consisting of two vascular bundles, cupula incompletely vascular.

The projecting apex of the nucleus is opaque, it is even now scarcely separable. A little later, and the usual enclosure takes place, adhesion at the same time taking place be-

tween the inner coat and the nucleus. The base of the testa which is thick, becoming more and more opaque, apparently from its cellular tissue containing air. No other changes than those of change of figure and size occur for a long time, except in the nucleus which is rapidly excavated and at length assumes the form of a membranous sac.

At the time of impregnation, the ovula is *somewhat* cylindrical, with a somewhat conical apex and a sub-dilated base, the testa is thick and fleshy, particularly its apex, the inner coat is also thick, and contains the nucleus, which although not separable, has every appearance of being a membranous sac rupturing on slight pressure.

Somewhat later the ovula has much the appearance of a dice-box with a conical lid, the secundine has become elongated and thinner, and its apex has commenced to assume a conical form, in which however no radicle cells are visible, the nucleus is correspondingly elongated but, still preserves its sacciform appearance.

The next stage at which I have examined it, is immediately antecedent to the full development, the seed is now an irregular oblong and truncate angular body, with a short thick and smooth funicle, the testa is greenish fleshy thick and rugose externally, its apex is somewhat radiately rugose, depressed towards the centre which is very thin, and elevated into an obscure point; to this the conical fleshy apex of the inner coat, which is now reduced to a membrane, corresponds. This is filled by the albumen, scarcely yet solidified. I have not ascertained the existence of the nucleary membrane. The albumen is *of course?* developed in the embryonary sac. The embryo is at this period to be found in the neck of the albumen which is short, it is obturbinate or obovate, cellular with a broad attachment. The lateral fissure is very distinct, corresponding to the obscure rounded, cellular plumula. The younger the state, the more developed is the fissure.

The only anomaly consists in the early adhesion of the

nucleus to the inner coat, and I must not omit to mention the appearance as if this was composed of two coats. If such were the case, the inner would of course represent the nucleus, but examination at a very early stage is sufficient to shew that it does not depend upon this.

LEMNA—*Germination of.* Pl. CCLXII. Fig. I.

1. Lateral view of germinating seed just commenced to float, *a* testa, *b* albumen, *c* cotyledon, *d* apex of nucleus? *e* radicle, *f* fissure by which the plumule is to escape.
2. Same viewed in front, *a* body of seed, *d e f* have same references.
3. Same laid open to shew the plumule detached from the seed, *a* cotyledon, *d e f* have same references, *g* plumule.
4. Apex of nucleus. 5 Do. vertically, less radiated than in Grantia.
6. 6, plumula separated, *a a* gemmule.
7. Gemmule separated.
8. 8. More advanced, the plumule has taken its exit through the fissure, 8*a* same separated from the seed.
9. More advanced, front view.
10. More advanced the plumule is now much exserted, *a* body of seed, *d e f g* same references.

10*b*. Plumule separated, at *a* its attachment, *b* gemmule. 10*a*, Seed etc., detached from plumule, *a d e f*—same references.

10*c*. Seed laid open, *a* testa, *b* membrane very fine, enclosing albumen, it is of a brown colour. 11, 11*a*. Plumulæ detached at earlier stages than preceding, *a a* attachment, *b b* gemmules.

12. Germinating plant much more advanced, *a* body of seed, *b* radicle, *c* upper edge of fissure, *d* plumule, *e* young frond with its root, *a a* chalaza.

12*a*. Same, young frond detached, *a* body of seed, *b* lower lip of fissure and neck of radicle, *c* fissure and plumule by which the plantule exists, *d* young frond or

plantule, *e* its attachment, sheath basilar of radicle, *g* new gemmule.

12*a*. Seed plumule and young frond detached, *a* body of seed, *b* radicle, *c* fissure, the apex of the nucleus fallen off by accident.

12*c*. Plumule detached, *a* its attachment, *b* fissure.

12*d*. Young gemmule, and axis with radicle, which is evascular, *a* axis which terminates in the attachment, *b* novell. gemmule.

There is a tendency to refer to the typical form in the oblique exit of the plumula, although this must still be considered as escaping almost from the centre of the radicle.

As also, in the non development of radicle from the plumula, which after having performed its functions, dies like other primordial leaves, separating about the period when the second frond is well developed, both it and the radicle, as their periods of service draw to a close, become white, the radicle a good deal sooner than the other.

There is some analogy in appearance between the plumule and an ovulum, see figs. *b*,*b*, for the gemmule which may be supposed to represent the nucleus, is at first exserted, subsequently becoming enclosed, to be again exserted, in which latter point it differs.

Lemna continued CCLXII. Fig. II.

1. Germinating plant, *a* upper lip of radicle, *b* seed towards chalaza, *c* plumule, *d* first frond, *e* second do-
2. Do., more advanced, the seed and embryo separate readily. The apex of nucleus still adhering to the lower lip of the fissure, both the radicle and plumule are whitish, *a* upper lip of radicle, *b* near apex of seed, *c* plumula, *d* first gemmule, *d a* its attachment, *e* 2nd gemmule *f* fissure of its exit.
3. Young radicle, *a* cellular sheath continuous with cuticular tissue; *b* radicle, its sheath scarcely distinct, or rather it is the sheath, the radicle itself is not yet developed.

4. Do., more advanced, *a* outer sheath; *b* its open apex ruptured by growth of *c*, inner do., which is the permanent one; *d* radicle.
5. Section of do., shewing that the true sheath, is solid, and that according to its capability of being excavated is its attachment continued; *a* base of outer sheath, *b* inner long section; *c* radicle.
6. More advanced; *a* outer sheath; *b* inner, now much projecting, *c* its place of separation from the axis, *d* radicle.
7. More advanced, *a* outer sheath, *b* its mouth, *c* inner do., *d* radicle, the opaque lines are so from air.
8. Bundle of raphides contained in a cell of outer sheath, these bodies abound in Lemna.

It is evident from this, that authors have been mistaken about the sheath, the inner and permanent one being always distinct from the outer, which is analogous to the usual sheath of Endorhizæ, the inner being a portion of the root itself.

I have not been able to see the exact modes of exit of this, whether it is by carrying off the conical top of the outer (see 3,) or by lateral tearing, the mouth of the outer sheath is irregular.

Lemna major of Calcutta. Pl. CCLXIV. Fig. II.

1. Fruit bearing plant.
2. Fruit.
3. Do., long section.
4. Seed. 5, do., long section through integument.
6. Inner tegument and its enclosures.
7. Same, long section shewing the embryo.
8. Embryo with its curious footstalk.
9. Same, *line shewn*, is this the same line that Brongniart figures as communicating with the chalaza?
10. Pressure employed, plumule shewn at *a*, something approaching dicotyledonary structure, but as the embryo is not fully developed, perhaps it is due to immaturity of the central tissue.

11. Embryo, slit visible distinctly.
12. Long section of another seed, through the testa.
13. Albumen, partly deprived of the inner tegument.
14. Do., separated.
15. Embryo seen laterally. 16, seen in front.

I conclude that the line seen, on the embryo in figs 9, 11, is accidental. In Lemna minor of Calcutta it does not exist, and even in this, would appear to be limited to one side.

From this it would appear that the radicle of the embryo does not point to the foramen, or that the radicle of the embryo is split, to admit of the egress of the plumule; which is the greater anomaly; the non correspondence of the apex of the radicle to that of the nucleus, or the complete inversion of the direction of the plumula? the study of the Germination can only settle this point.

Consult Br. in Kings Voyage.
,, Brongniart in Archieves Botanique.

Lemna major continued CCXIV. Fig. I.

I. Plant.
2. Do. Single frond.
3, 4, 5, 6, 7, 8. Spathæ and genitalia at different periods, in 8 spathe reflexed.
9, 10, 11. Genitalia at different periods.
12. Stamina, 12*a*. Pollen.
13, 14, 15. Ovula, 14, an abortive one.
15. Ovulum shewing its coats, *a* testa, *b* inner membrane, *c* nucleus, not demonstrable as a separate coat.
15*a*. Do., outer coat separated except at its base, the apex of the inner coat becomes the radiated covering the cap of the root.

Lemna continued CCLXIII.

1. Frond of Lemna.
2. Solitary ditto., *a* conical point corresponding to opposite part of frond *b*, which is always emarginate.

3. Frond laid open over the flower and young frond, shewing that these originate from the same spot, in opposite directions. The elevated line *a*, corresponds to the emargination, and to the conical point, from opposite the point of the origin of the above, arises the radicle.
4. Flower.
5. Do., with two stamina which are always unequally developed.
6. Stamen before dehiscence.
7. Do., after dehiscence.
8. Pollen M. 800.
9. Youngish ovule.
9*a*. Same, testa laid open.
10. Ovule at time of impregnation, or dehiscence of anther.
10*a*. Same testa divided.
11. Young seed, *a* testa, *b* nucleary tegument with its caplike apex, *c* albumen, *d* embryo, *e* plumula.
11*a*. plumule separated, no frondule yet visible M. 3-400.
11*b*. Cap of nucleus M. 3-400.
12. Farther advanced.
12*a*. Long section same figures have same references.
12*b*. Embryo separated.
12*c*. Plumule, young frondule just developing consisting of a single cell.
13. Capsule after escape of seed.
14. Capsule halved to shew the seed.
14*a*. Seed, *a* raphe, *b* micropyle.
14*b*. Nucleary membrane of do.
14*c*. Embryo.
14*d*. Do., viewed on one face, and as an opaque object.

GRANTIA.

General Remarks.

I am of opinion notwithstanding the searching spirit of inquiry that has been directed to the Plants of lower Bengal, that many unknown species may still be found around Calcutta, of which we have an example in the present instance, for although many species of this family were known to Roxburgh nearly forty years ago, yet subsequent collections sent from India only contained one species, and that was obtained from the Herbarium of Buchanan.

To those indeed who estimate the interest of a plant merely from the size of its flower and the gorgeousness of its colouring, this family is not likely to be attractive. These minute plants are however interesting as exhibiting indications of wonderful design in the adaption of the most simple structure to the highest functions of vegetable life.

I have dedicated the genus to my friend Mr. James William Grant of the Bengal civil service,* as a mark of respect for his superior mind, and in token of my admiration of his success as a first-rate microscopic observer.

Grantia *novum genus.*

Planta minima tota vix lineam longitudine excedens constans e frond. minutis. ($\frac{1}{4}$ of a line in greatest diameter) cellulosa : supra planiuscula et viridis.

Subtus in radiculam longam simplicem subcylindricam product.

Vasa nulla (Stomata confined to the upper surface) Repro duct. ex oritur fronde novella, hinc e substantia frondis parentis exserta ; frondes frondiferæ raro floriferæ.

Flos centralis e medio substantiæ frondis oriens sursumper paginam superam frondis rima longitudinali vix irregulari protrudens.

* Now of Elchies in Scotland.—Ed.

Spatha nulla. Stamen unicum ad dehiscent. longiuscule exsertum. Filamentum. robustum cylindricum, cellolosum. Anth. terminalis subreniformis unilocularis secus diametrum brevius dehiscens, cellulis fibrosis donat. valvulis demum revolutis. Pollen sphæricum glabrum.

Pistillum subcentralo ovatum ex ovario ovato 1 loculari. Stylo subattenuato. Stigma sub simplex vix cellulosa. Ovulum unicum erectum.

Testa cyathiformis crassa, apice apertissimo. Nucleus apice conico exserto. Fecundatione peracta frons gradatim marcescit, et demum fere annihilatur reliquis laxissimis. The seed having sunk to the bottom, and there formed a nidus.

Semen ovato-rotundatum minutissimum. Testa apice aperta irregulariter ima basi brunnea cæterum albida, cellulis spiraliter dispositis, crassa.

Tegumentum nucleare tenuissimum membranaceum apice conico brunneo coriaceo, e cellulis centrum versus radiantibus. Albumen paricum includens, Embryo cum apice nuclei secedens oblongum carnosum albidum indivisum inperforatum. Plumula centralis, frondiformis orbicularis planiuscule basi frondulum novellum minutissimum semi-fovens.

The seeds germinate among debris of the fronds, as the embryo enlarges it becomes more firmly attached to the concealed apex of the nucleus, and by its growth at length tears this up from its original connexions. At this stage the conical cap will be seen projecting beyond the very wide somewhat irregular mouth of the testa.

The embryo continuing to grow to the upper portion, which is always rather large, protrudes, carrying with it the cap.

In the early stage of protrusion that part immediately adjoining the cap is annuliform or constricted, but it is strictly continuous with the body,although it is sub-separable, it is of a rather more dense nature, this it shares with the apex of the enclosed part. The Plumule is central and entirely enclosed, it is already green. As the growth proceeds the protruded part becomes much enlarged, and has a very cellular aspect. It

then rises to the surface where all the subsequent changes are carried on.

The seed at this stage looks as if it had a comparatively large fungous growth from its apex.

When it has reached a considerable size relatively to the seed itself, it becomes split along its upper margin by the growth of the plumula, but the cap always adheres to one, and generally to the lower margin.

The plumula which is always frondiform continues to grow, it does not separate from the embryo for a long time. The embryo never loses its attachment with the seed, not indeed until it has nearly reached its full growth. Long before this, the young frond has commenced to develope another from its included base, and thus the plant goes or increasing.

All the specimens I have had did not appear to produce more than one frond, for having completed this they became dissolved in the water in which they had previously grown.

I have not been able to ascertain whether there is a slit for the emission of the plumula, but I think not.

The nature of the parts is obscure, judging of them by their situation, the fungous growth is a growth of the radicle, and the included part is the cotyledon, judging from appearances, and analogy with the formation of the mature frond, the in-included part is radicle, the fungous growth, cotyledon.

The whole evidently performs the office of the cotyledon; originally it is filled with granules, which subsequently disappear as the plumule becomes more independent.

The marked points of difference between this and Lemna consist in its cellularity and want of stomata, the absence of a spatha, the axial exsertion of the flower, the unilocularity of the anther, and the antitropism of the ovulum.

In addition its pollen is smooth, the ovulum solitary, and the radicle has no covering, being a production of the substance as well as of the surface.

The species may be thus characterised.

(1) *Grantia microscopica.*

Flos axilis e centro paginæ superior exserta, spatha o. Anth. unolcularis.

There is I think one other species of this genus which was known to Roxburgh as Lemna globosa (?) I have not hitherto met with it in flower.

It is still more minute, the longest diameter being $\frac{1}{4}$, the shortest about $\frac{1}{8}$ of a line. The fronds are green, oblong or nearly elliptical, and flat throughout a certain portion of the upper surface, otherwise very convex.

The flat discoid part is provided with stomata of LARGE size, the annulus of which is quite entire. As in the first species, these organs give the surface a papilose appearance. The similarity in appearnce between the fronds and the ovula is remarkable enough.

The cells of both surfaces contain globuline. The large central cells are nearly devoid of this, as well as those forming the neck of the aperture, from the point where the young frond is exserted.

The reproduction by fronds consist of a continued succession of young fronds, developed opposite the attachments of each older one, these are at first enclosed, but as the development commences near the margin, they are not long in coming into immediate contact with the water in which they grow. Their similarity with the plumule is likewise remarkable, in fact no difference exists between them.

The exit of the plumule is also sufficiently like that of the frond, for it must be remembered that it is not terminal, otherwise it would carry up with it the cap of the nucleus.

It is this plant which may truly be called a reduced Aroidea it will from the transition between the two orders.

(?) It must be remembered that the stamens of Lemna are hypogynous, a distribution not perhaps known in true Aroidea, in which they are always at a distance from, and above female organs

Lemnaceæ, represent Podostemon in Dicotyledons, and

it is curious that their embryo has a greater affinity to that of the grand division in question, than any other Monocotyledon. Indeed in appearance they are almost exactly alike, but if my views are correct, they differ only in reality in the plumule being central not oblique.

Lemna has spiral vessels, as well as stomata, in some species even the filament is vascular. The induration of the foramen secundine is in my opinion an induration of the apex of the nucleus.

Neither is there a lateral slit for the emission of the plumule.

Grantia microscopica, Pl. CCLXVI.

1. Flowering frond.
2. Same after removal of the flower, shewing the nature of the fissure and its regular edges.
3. Long section of no. 1.
4. Flower separated. 4*a,* mobile granules of very irregular sizes, abounding in the tissue of the frond about the base of the flower.
5. Stamen before dehiscence.
6. Anthers just after dehiscence.
7. Pollen.
8. Pistillum, or rather female flower.
9. Ovulum at the time of dehiscence of the anther.
10. Same, testa halved.
11. Young ovule.
12. Do., more advanced.
13. Flower some time after fecundation.
14. Seed of do., testa removed.
15. Long section of do., *a* testa, *b* nuclery membrane, with its concealed apex, *c* albumen, *d* embryo.
16. Embryo of do., under slight pressure.

Grantia microscopica continued Pl. CCLXVIII.

1. Seed after germination, *a* radicular end now split, much enlarged and cellular, *b* plumule semi-exsected.
2. Embryo and plumule removed.
3. Same plumule removed.
4. Same halved, 4*a* same viewed obliquely shewing the attachment of the cap of nucleus, *a*.
5. Embryo and cap before the protrusion of the plumule just developing at *a*, at this stage it is filled with granules.
6. Seed, *a* testa, at *b* is seen the cap of the nucleus just protruding.
7. Seed germinating, *a* testa, *b* nucleare membrane which is a mere brown film, *c* albumen, *d* cotyledon, *e* radicle, *f* cap, *g* plumule.

7*a*. Plumule separated, frond bearing rudiments of a frondule.

8. Seed before germination, *a* testa, *b* nucleary, *c* its cap.
8. Long section do., testa mostly removed, shewing testa, nucleary, cap, embryo, cotyledon, and radicle.
8. *a*, its plumule separated.
6. *a*. Embryo with cap at earlier period, *a* cap, *b* radicle, *c*, cotyledon.

Grantia microscopica continued, Pl. CCLXVII.

1. Seed germinating the annulus visible at its apex is not a distinct structure, *a* testa, *b* nucleary membrane, *c* its apex carried up by the embryo, *d e* its radicular end.
2. Nucleus separated at a somewhat earlier period. Plumule represented as visible, owing to slight pressure. 2*a*. Its plumule, separated frondule commenced.
3. A similar nucleus.
4. Plumule more developed. 4*a* frondule already commencing to throw off another.

5. Seed, germinating but before emission of the plumule, the annulus has disappeared, *a* testa, *b* cap of nucleus, *c* exserted cellular radicular end of embryo.

5*a*. Same separated, *b* cap of nucleus, *c* exserted radicle, *d* cotyledon appearance of adhesion at its apex due to albumen, *e* Plumule faintly visible from pressure.

6. Frond shewing the reproduction by fronds, *a* new frond much developed, *b* its frondule, *c* new frondule of larger frond.

6*a*. same separated to compare with plumules.

The other species alluded to may be characterised as follows.

(2) *Grantia globossa* frondibus eradiculosis supra disco planiusculo instructis. cæterum convexis. Circa Calcuttam.

The evolution of fronds is successive; before the most developed has separated, another has been developed and this has an obliquely ascending direction. More than one however never exists exserted, at least to such an extent as in Lemna, in some species of which, 4 or 5 may co-exist.

From Grantia, which is remarkable for its simplicity of structure, we learn that the nomal situation for the development of the frond is terminal, not lateral as usually happens in Lemna.

In the other species which has also similar stomata, the flower scarcely *breaks out* even in an early stage, but still when another is above the level of the frond, the opening is evident and its margins are not lacerate.

The views here given are consonant with ordinary formation, as regards the embryo; the only anomaly, and which is more apparent than real, consists in the plumule bursting out through the root.

If the included part be considered root, fatal anomalies present themselves, 1st as to its not corresponding with the apex of the nucleus, 2nd in a less degree, to its non exsertion from the seed.

Mr. Brown has adverted to Lemna in such a way as would lead one to suppose that this included part is radicle.

PHILYDRACEÆ.

In Philydrium lanuginosum, the sepals are certainly 3, as shewn by development, the coalescence taking place at a very early period, and the sinus protruding a tooth occasionally of some size.

The anther is simple, and entire at first, but soon becomes emarginate, then bilobed, the cell is marked out along the margin, and from the two cells originally being on one line as the emargination increases, they become as it were placed back to back.

Although the vessels are 2, and tho' unusually branched in the connectivum, yet the anther is certainly simple.

The Petals are visible at the earliest times I have seen the anther, they are always smaller than it.

There is nothing remarkable about the developments, of the Pistil, except the *minority* of the carpel leaf opposite the stamen.

The consequence is, that its real structure is to have the posticous 2 sepals united into one.

To have two petals alternating with the posticous and anticous sepal, and therefore the posticous petal wanting.

Anticous stamen developed, the 2 posticous wanting.

Then again as in so many Monocot's, such as Irideæ, the carpel leaves are opposite the stamens.

It is difficult to tell exactly whether the petals are true petals. They certainly are of a different series from the stamens. Their venation is that of petals.

The venation of the filament is remarkable, and the only instance of the kind known to me, out of Scitamineæ, the branching into the connectivum appears to me *unique.*

The Pistilla keep throughout their bi-stigmatic apices, an argument in favour of the origin of stigmata from the placentæ.

The seeds are singular, being quite cellular, the chalazal end is very large, of lax roundish cells. The foramen striated spirally, and very large.

The pileus of the inner membranne is just like that of Lemna!. The Embryo requires more examination as well as the venation of the stamens.

I do not understand the coalescence of cells at the apex, in young states.

The pollen sketches from the period which the mass is distinctly cellular, are measured, so as to be proportional.

Philydrium stages of development. Pl. CCLXX.

[1. Each cell is filled by a membronous bag, crowded with grumous matter already beginning to be nucleary and aggregated, the aggregation is I think, irregular.

2. Anterior posterior and lateral.

3. Pollen grains forming a mass in each cell, simple, imbedded, in reddish mucilaginous tissue, each grain contains a number of knife-like parts—raphide-bundles, no common cellular membrane.

3'.*d*, Anticous sepal, *c e* petals, *b* stamen, *a* pistil, part next the stamen very faintly marked.

4. Stamens etc. more advanced, *a* anterior sepal.

5. Pistil etc. more advanced.

6. Ditto more advanced. Together with Pollen. 550. M. taken from an anther when the grains were slightly coherent, and now almost all are quaternary, so that the irregular aggregation of the earlier stage seems to be accidental. Whence it follows that all compound grains are not structurally so.

7. Plan of vascularity of the style.

The above sketches of development are numbered progressively from 2 to 7. According to the stages of development.]

Philydrium lanuginosum. Pl. CCLXIX.

1. Apex of spike.
2. Flower nat. size.

3. Flower : anticous sepal reflexed ; *a, a* petals or barren stam. (Brown.)
4. Anticous view of Petals, Stamen and Pistil.
5. Posticous ditto. all the hairy part is pistil.
6. Lateral view of ditto, rather young.
7. Inner view of stamen and petals.
8. Outer view of stamen.
9, 10. Pollen.
11. Pistillum. 11*a*. Stigma. 12. Transverse of ovary.
13. Young ovule. 14. Mature ditto.
15. Fruit. 15*a*. Ditto bract removed, perianth remains.
16. Ditto Transverse section.
17. Seed, *a* hilum, which is obscure, *b* foramen, *c* chalazal end.
18. Indurated Lemnoid end of second tegumen.
19. Long section, *a* hilum, *b* foramen, *c* chalazal end, *d* inner membrane, *e* its indurated end, *f* albumen, inclosed in a proper membrane, *g* embryo.
20. Inner tegumen, separated, enclosing albumen. 21. Embryo. 22. Relative situation, *a* postice.

I am not quite certain whether the inner membrane is the plicate one or not, I think so, the pileus as evidenty the exserted part of fig. 14 ovulum. *Malacca, July 22nd*, 1842.

JUNCEÆ.

Juncus unibracteatus. Gr.

Annua aggregata, cæspitosa, decumbens.

Caulis compressus anceps simplex.

Fol. alternantia distantia imis approximatis equitantia, partis equitantis margines membranacei, hyalina, scalpeliformia linearia, acuminata, septata.

Flores in capitulis 3-6 floris congestis, inconspicui herbacei coloris : capitulis subcorymbosis, centralibus brevius pedun-

culatis et prius evolutis, pedunculis basi bracteatis. Flores basi bractea membranacea hyalina naviculari subtensa, subsessiles.

Perianthium 6-sepalum duplici serie; sepalis lineari-lanceolatis concavis, viridibus apicibus rubris, 3 interior, exterior alternant. paullo minoribus æstivatione imbricata.

Stam. 3, hypogyna, sepalis exterioribus opposit. Filam. sepalis duplo brevior basi incrassata. Anth. erectæ biloculares lateraliter dehiscentes basi affixæ. Pollen angulat. ternatim compositum. Antheræ post dehis. ad angulum rectum cum filamentum flexæ. Ovarium ovatum conicum 3-gonum, *faciebus* sepalis interioribus oppositis, ideoque angulis cum his alternant. Stylus 1. Stigmata tria papillosa longiuscula, sepalis interior opposit. 1-loculare, placentis 3, parietalibus. Ovula oo seriata, foramen hilum prope.

Capsula ovata 3-gona, acuminata sursum curvata, stylo stigmatibusque persist. coronata, 1-locularis. Lamina valde (immatura) angusto-ovata, utrinque attenuata, funiculum longiuscula terminantia, tegumenta bina, exterius areolata lutescentia interius tenuissima nucleo adhærens, demum liberum nucleus ovatus inversus apiculatus apice tegumento interiori firmé adhærenté! demum liber. Albumen copiosum. Embryo basilaris hilo approximat.

Fig. 8. Pl. CCLXX.

a testa, *b* secondary, *c* nucleary, *d* albuminous, *e* embryo. Raphe nulla.

Hab. Mogur, every where about in the sands of the *Brahmaputra: March* 29*th*, 1836.

ALISMACEÆ.

Sagittaria sp. Foliis nutantibus hastato-obtusis, Floribus racemosis, carneis, racemis foliis brevioribus.

Hab. in aquis stagnantib. *Mergue: August*, 1834.

The petioles of this species are divided into chambers by phragmata which intersect the air-cells forming the greater part of its bulk. The organization of these partitions is precisely that of Eriocauloneæ, but of greater regularity, consisting of large pentagonal or polyagonal cells, at the different angles of which, there are tri-angular apertures in the tissue, the apices of these angles invariably point towards the centre of the larger cells, their edges are most distinct, I am inclined to think them apertures, *1st* from their colour being always the same as that of the field in which they are viewed, *2nd* from the remarkable distinctness of their edges, *3rd* from being invariably destitute of the viridescent corpuscles, *4th* because when the cells are torn, no membrane whatever can be traced across these openings.

COMMELINÆ.

1. *Commelineæ.*

Caulibus laxis ramosis,radicant. junioribus striatis. Foliis distantibus petiolatis, acuminato-lanceolatis, 10-12 nervis, subtus glaucis, petiolis ochreæformibus, vaginarum apicibus ciliatis. Floribus paniculatis, pulchre cyaneis, conspicuis, paniculis folio cordato-ovato conduplicato ad originem ramorum, paucifloris. Cal. 3-sepalus, sepalis membranaceis. Pet. 3, inæqualia, 2 superiora majora. Stam. 6, quorum 3 fertilia, 1 majore sagittato, 3 reliqua abortientia, connectivum mere gerentio. Stylus filiformibus tenuissimus. Stigma simplex.

Hab. In aquosis *Mergui* : *September*, 1834. *Merg. Herb.* 301.

2. *Tradescantia panicutata Roxb.*

Decumbens radicansque. Caulibus attenuata pilosa. Vaginar. marginibus ciliatissimis. Fol. lanceolatis acuminatis supra scabris. Paniculis racemosis terminalibus densis, subovatis ; floribus albido-purpurascentibus. Cal. 3 sepalis, extus

pilis glandulosis hispidissimis. Petalis 3, ovatis, sepalis alternant. purpur. cito marcescent. quorum 1 difforma angustius.

Stam 6, hypogyna, libera. Filam. glabrum, perianth. longiore subcapillatum. Anth. bilocul. basibus affixæ. Ovarium breviter stipitatum. Stylus subulatus pallidissimus purpurascent, hujus coloris etiam filament, longissimus. Stigma papilloso-capitata. Ovarium biloculum, loculis 1-ovulatis, ovulis erectis.

Hab. In humidis sylvosis super inundatis, *Mergui: November*, 1834. *Moulmein copiosa. Merg. Herb.* 684.

Omnibus fere notis accedit, sed ovar 2 locul. 2 ovulatum et breviter stipitatum.

3. *Tradescantiæ sp.*

Caule decumbente radicante, infra florifero foliorumque vaginarum reliquis obtectis, ad geniculos tumidos, superne sulcato. Folia ovato-lanceolata acuminata basi in petiolum attenuatum, venis parallelis, ciliata, *lineâ pilosâ intro-marginale.* Petiolis vaginantibus ochreas efformantibus villosissimis, villis in lineis dispositis. Inflorescentia cymosa, e geniculis orta, pedunculis abbreviatis densifloris. Cal. 3-sepalus, sepalis rubro-aurantiaceus dorso pilosa. Pet. 3, membranacea hypog. sepalis alternantia. Stam. 6, longissima hypog. Filam stuposa demum spiraliter convoluta. Anth. bilocul. apices versus dehiscent. Stylus longiss. demum spiraliter tortus. Stigma subcapitata. Ovarium subturbinatum, apice 3-lobo, lobis rotundatis, 3-loculare, loculis 2 ovulutis. Calyce colorata connivent. obtect. extus pilosum. Ovulis medio affixis. Embryo curvatus.

Hab. In sylvis *Kyouklag* : *August*, 1834. *Merg. Herb.* 185.

Pedunculi pedicelli bractæque rubri. Pet. alba. Flores expansos nondum vidi.

4. *Aneilema crocea.* Gr.

Caulibus decumbentibus radicantibus. Foliis amplexicaulibus cordato-ovatis, nervosis, acutis, marginibus diaphanis

utrinque sublente papulosa. Floribus solitariis vel 2-3, in axilles foliorum superiorum, aurantiaceo-ochroleucis. Pedicellis pubescentibus foliis longioribus.

Hab. In aquosis. *Kulweng: Oct.* 1824. *Merg. Herb.* 387.

5. *Aneilema lanufolia.*

Caulibus decumbentibus, radicantibus. Foliis vaginantibus lanceolato-oblongis 6-nervis, vaginum marginum ciliatis, summis liberis, inferior ochreas efformantibus. Floribus paniculatis cæruleis. Cal. 3-sepalus, sepalis æqualibus persistentibus. Cor. 3-petala, pet. sepalorum longitudinis sed latior. Stam. 6, stuposa, quorum 2 tantum fertilia, petalis alternant. 3 sterilium clavata, 1 connectivum bi-auriculatum gerento. Anth. biloculares, long. dehiscentes. cæruleæ. Ovarium 3-loculare. loculis 2-ovulatis. Stylus subulatus. Stigmata capitata. Capsula subturbinata, obtusa 3-gona, dehiscentia loculocida. Sem. angulata verrucosa, albumen carnoso-corneum.

Hab. In graminosis humidis *Kyouklag* : *August* 1834. *Merg. Herb.* 197.

BURMANNIACEÆ.

Burmannia sp. Pl. CCXXII. Fig. II.

Burmannia azurea Pl. CCLXXII. Fig. I.

Spithamæa vel dodrantalis, simplex, pallida.

Fol. lineari-lanceolata imbricata acuminata pallida, superior adpressa, inferior rad. ascendente.

Flores 2-5 in cymus terminalem dichotomum dispositi vel solitarii (flos. centralis tantum evolutus) pallide-azurei ratione magnitudine plantæ totius mag.

Bracteol. linearis subtus flores laterales quæque alæ rotundatæ utrinque subrepandæ, longitud. latitudinem 3½ excedens.

Perianthium 3-fidum, albidum; laciniis subcordatis, aliis

oppositis, marginibus induplicatis vel quodammodo fissis. Sinus lacinulem adnatam apice liberam setaceo-subulata gerens, faux viridescens.

Stam. lacinulis opposita fauci inserta.

HAB. *In Pascius Malacca communis.* Anth. bilocul., initio apice poroso demum fere omnino explanat. Pollen simplex. Stylus clavatus, 3-sulcatus, stigmata 3, bi-labiata, labio superiore stigmatico carnoso crasso, emarginato; inferiore membranaceo. Ovarium inferum 3-loculare, half the length of the flower, cells opposite the wings.

Ovula oo, minuta, anatropa.

Capsula perianthio membraneo inclusa, membranacea, 3-locularis.

Semina oo, anatropa, lutescentia striata, chalaza submammilliformis. Embryo apiculat.

1. Plant natural size.
2. Apex of a bud shewing valvate æstivation.
3. Flower.
4. Shewing the lacinulæ of sinus and the double, or split edge of sepals.
5. The same, shews that the edges of the lacinulæ are sometimes at least split also.
6. Perianth laid open; style etc. removed.
7. Lateral view of stamen.

7*a*. Same just opening.

8. Posterior view of do.
9. Under pressure, one cell.
10. Outer face of stamen. 11. Do. inner shewing attachment.
12. Pollen.
13. Pistillum.
14. Stigmatic lobe, or rather one style in front.
15. Ditto lateral.
16. Ditto in front, membrane pushed back, shewing the chink-like place under it for true stigma.

13. Style apex of, and stamina as they frequently separate.

13*a*, True stigmatic surface *a*, opening.
17. Transverse of ovary. 18. Shews placentation.
19. Ovulum. 20. Do. Young. 21, 22. Do. various stages.
23. Transverse of fruit.
24. Seed. 25. Long section (made up.)
26. Nucleary body, I-250 M.

This species of Burmannia has stomata. The stem simulates a dicotyledonous structure, having a central cellular part, then a thick zone of ligneous tissue *i. e.* fibres and vessels, their lax tissue corresponding to bark.

So that it would appear to be evident from casual examination of appearances, that the stems of herbaceous plants are often not be positively referred to either of two great systems

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TACCACEÆ.

Tacca pinnatifida. Pl. CCLXXII.A. Fig. I.

Herbacea, 3 pedalis. Radix tuberosa. Foliis longe petiolatis, petiolis fistuloso-sulcatis basi pedunculum amplectent supra decompositis, luteo-viridibus.

Bracteæ plures luteæ, oblongæ, obovatæ spathulatæve, spatha referentis. Pedicellis quibusdam sterilibus longiformis. subulatis luteis, fertilibus multo brevins sulcatis. Perianth-superum campanulatum, 6-partitum. laciniis alternis minoribus ? Stam. totidem sepalis opposita et iis inserta. Filam. basi dilatata, apicibus introrsum, cuculatis. Antheræ biloculæ. Stylus brevis. Stigmata 3, dilatata. Ovar. 1-locul. placentis 3, pariet.

Bacca calycis limbo connivento coronata, 1-loculis, matura brunnescente angulis. Sem. oo, ovata pulpa immersa, an arillata, brunneum extus longitudinaliter sulcatum. Tegumentum duplex, externum coriaceum internum albidum. Albumen copiosum ramoso-corneum. "Embryo minutissima in regione umbilici" R. Br. extus cellulosus, solidus rima nempe o, intus materia grumosa replet. micropyle distinctiss.

Merque: October 26*th*, 1834.

The same. Pl. CCLXXII.A. Fig. II.

Perianthium superum, 6 partitum; laciniis oblongis exterio ribus minoribus interioribus æstivatione imbricatis. Stam. totidem laciniarum bases versus affixæ, filamentorum basibus delatat is laciniis adnatis. Margines partes adnatæ carnosæ introfle xæ apicem versus corpus glandulosum papillosa utrinque gerentes. Pars libera complanata deorsum curvata. Antheræ basibus affixæ. Connectivum maximum cucullatum basi utrinque auriculatum, loculi lineares didynamæ curvatæ, longitudinaliter dehiscentes.

Styli 3 inclusi adnati breves, basibus extrorsum in corporibus totidem sanguineo purpureis pilosis glandulosis productis. Stigmata lateralia obcordata, subtus paulo medium faveolâ transversâ excavat.

Ovarium inferum 1-loculare, ovula oo, placentis 3, parietibus affixæ, funiculis longiusculis. Locus chalazæ extus gibbosæ, foramen conspicuum hilum prope. Tegumenta bina distincta, quorum internum ut solit inversum.

Herbæ erectæ, radices tuberosæ fol. simplicia vel decomposita, flores umbellati. Pedunculi infimi umbellæ cujusque in filamenta subulate longissima abeuntes. Color florem herbaseus.

Genus notu dignum: Typus forsan 18 andrus, et monodelphus, ob processubus lateralibus cujusque filamento. Structura *connectivo stigatisque* consimilis. Folia carpellaria laciniis perianthii exterior opposita. Placentæ interioribus. Secundinia ovulorum *per Juvenum* priminia inclusa. Raphe placentæ proxima.

1. Style.
2. Ovary.
3. Ovule long section.
4. Stigma inferior surface.
5. Ditto long section.
6. Anther transverse section.

7. Ditto inferiorly.
8. Sepal, 9 alternation of organs.

June 21st, 1835.

AMARYLLIDEÆ.

Alströmeria triflora Gr. Pl. CCLXXIII.

Planta subpedalis elegans glabra. Bulbus.

Caulis teres, foliis paucis sub 3-nis linearibus, plus minus tortis glaucis carnosis, margine albis, venis rectis indistinctis superioribus basi ⅓ amplexicaulibus, inferior ½ amplexicaul. Umbella tri-flora vel 4-flora, bracteis (nearly on the same plane) lineari-acuminatissimis centro viridibus cæterum membranaceis.

Pedicellis alabastrorum erectorum oblongis suberectis uncialibus curvatis. Flores speciosi cernuo-nutantes, ampli, pulchre purpureo-cyaneis, inodori. Perianthium 6-sepalum, sepalis lineari-oblongis, exterioribus paullo angustior. et paullo longioribus, triveniis, vena centrali subcariniforme, lateralibus 2, latiusculis, parum elevatis, interveniis depressis, laciniis apices versus patent. Stam. 6 declinat. an semper. Filam. filiform. (3 laciniis inter oppositis ⅓ longioribus) filiformibus, concoloribus, laciniis brevioribus, basibus lacinear. adnatæ, Anth. oblongæ, biloculares longit. dehiscentes, basi affixæ.

Pollen oblongum glabrum (imperfect. visum.)

Ovarium inferum, obscure trigonum triloculare, centri portione parvua vacua, septis lutescent crassis placentis spongiosis.

Ovula plura cuique loculo, transversa ordinaria, *anatropa.*

Stylus apicem tortus infra medium trigonus, concolor apice tripartibus ramis subrecurvis. Sepalis exterior oppositis. Stigmata ramorum fasciem internam nuncupantam.

Affghanisthan. Quettah: in campis. Found by Capt. Wheeler.

1. Plant natural size of the only specimen seen.
2. Flower.
3. Do. sepals somewhat spread out.
4. Outer sepal and stamen. 5. Inner do. and do.
6. Ovarium and base of style, with two inner, and one outer lacinia, the later placed wrong, in front is the cicatrix of an outer sepal opposed to one of the flat faces of the style, and therefore to the back of the carpellary leaf.
7, 7. Anthers after dehiscence. 8. Pollen, from stigma.
9. Pistillum. 10. Ovary transverse, near the centre.
11. Ovula. 12. Do. long section. 13. Apex of style with the stigmata. 14. Transverse of base of style.

MELANTHACEÆ.

Melanthacea Pl. CCLXXVIII. Fig. II. *Affghan.*

LILIACEÆ.

1. Liliacea Pl. CCLXXVIII. Fig. I.—*Affghan.*

Lilium.

2. *Lilium longifolium* Pl. CCLXXVII. *It. Notes* p. 345. *Affghan. no.* 87.

3. *Lilium* Pl. CCLXXVI. *Affghan.*

Tulipa.

Tulipæ sp. Pl. CCLXXVI.

Shews the incipient steps of fecundation.

1. Ovulum. Boyaux seen passing into the foramen.

2. Nucleus and secundine, which cohere intimately, apices detached : this is an early stage ; the oblique line communicating between boyaux at its entrance and the apex of the nucleus being yet visible.

3, 3. Ditto ditto more advanced, the opaque irregular line now distinct, the right hand figure, shews an irregularity in the boyaux, the nature of which I have not been able to ascertain.

4, 4. Similar period, submitted to pressure, it being almost impossible to separate the nucleus from the secundine, the entrance of the boyau into the nucleus and its cul-de-sac termination within its apex, are seen distinctly enough.

5. More advanced, the boyau disappeared, the opaque line much less distinct, the cavity for the embryonary sac commencing its formation in the apex of the nucleus.

6, 6. Pollen and boyaux.

7. An irregular boyau. *It. Notes. p.* 333. *Affghan. no.* 43.

Hyacinthus.

Hyacinthus purpureus Gr. Pl. CCLXXV. *It. Notes. p.* 338. *Affghan. no.* 60.

Muscarus.

Muscari sp. Pl. CCLXXX.

1. Plant, full sized specimen.
2. Alabastrum upper ones sometimes, perhaps generally barren.
3. Flower.
4. Do. laid open.
5. Anthers front lateral 3 back views.
6. Anther dehiscent.

7. Pollen. 8. Ditto immersed.
19. Pistillum. 10. Transverse section.
1. Pistillum additional style developed.
11*a*. One cell opened along the back.
11*b*. Transverse section.
12. Ovulum.
13. Do. long section. *It. Notes p.* 242. *Affghan.* 357.

CONVALLARIA.

Convallaria. Pl. CCLXXIV. *It. Notes p.* 175. *Boot. no.* 896.

SMILACEÆ.

Smilacina bootanensis Gr. Pl. CCLXXIX. *It Notes p.* 178. *Boot. no.* 920.

APOSTASIA.

Apostasia Brunonis. Griff.

Perianth. superum 6-partitum, sepalis longis linearibus revolutis, 3 interior angustior. Columna nuda teres deflexa. Antheræ 2 biloculares long. dehiscentes. Ovarium 3-loculare, placentis axilibus bipartitis. Stylus antheris paulo longior. Stigmata capitata.

With respect to the pollen, in this species at least, it has no affinity whatever with that of Orchideæ, Mr. Bauer however has figured that of A. nuda, which has a manifest and close resemblance to the pollen of Orchideæ, as may at once be seen by comparing his figure of the Apostasia with tab. 5 of the same work. The pollen of Apostasia, is *pulvere-*

ous: and differs only from the common form of pollen in having but one tegument. It appears to be lanceolate-ovate, with one or three elevated lines of a whiter colour than the remaining part. Immersed in water, the lines generally disappear, and it appears like an oval or roundish vesicle, very transparent, containing very minute granules and a viscid fluid. There is no ternary or quaternary cohesion, Mr. Bauer's figure of the transverse section of an anther, gives an idea of its having partially a double wall, or that the outer wall of each cell is composed of two laminæ. In that I have examined, the parietes are simple. With respect to the ovula, the foramen is close to the hilum, and is distinct enough about the time of expansion.

The style is recurved in a groove between the cells of the *right anther*, the connectivum of which is larger than that of the left. I have said right and left, the correctness of which may be doubted as the odd sepal, is perhaps posticous.

Perianth. explanatum, revolutum. Sep. lineari-acuminata 3-nervia, apicibus cucullata mucronataque. Pet. totidem iis alternantia angustiora, obtusa, 3-nervia, nervis lateralibus minimis, medio crasso prominulo paullo infra apicem terminali et in processum mucroniformem abeunte. Columna teres brevigeniculata. Anth. 2 discretæ ovatæ biloculares longit. dehiscentes. Pollen pulverem simplex. Stylus teres antheras paulo superans: inter loculos *unius* receptus. Stigma capitato-papillos. Ovar. 3-loculare, perianth. unguibus persistente, coronat. loculis oo-ovulatis, ovulis placentis axilibus affixis, foramen hilum prope.

Bracteis membranaceis rubescent. 1-2 (?) cuique flora. Cal. disepalus, sepalis ovatis, concavis nervo dorsali carinato, viridia. Pet. 5 perigyna inæqualia 2 interiora nempe minora, obovata bifida sessilia. Stam. plura, *perigyna* cum petalis inserta libera, filamentis subulatis, petalis brevioribus luteis. Anth. biloculares *cellulosæ*, loculis longit. lateraliterque dehiscentes. Pollen rotundatus *læve*. Stylus subcavatus luteis, filam. paulum brevior. Stigmata 4-5 linearia, papillosa, stylum

fere æquantia. Ovarium semi-inferum 1-loculare, ovula oo. placento centrali libera affixa, reniformia, foramen hilum prope. Capsula ad medium circumscisa, tubo calyce etiam circumscisso, adnatoque stipata, 1-locula. Semina oo, reniformia, funiculis longis affixa, tuberculata, tuberculis in lineis dispositis. Albumen farinaceum. Embryo curvatis periphericus, radicula hilum prope, cotyledones plano-convexos, plumula inconspicue.

In ruderatis *Mergui: October* 1834.

The tube of the calyx is prolonged *incumbently* up on the ovarium beyond the circular line which marks the site of its *circumscission* as well as that of the capsule. It is into this part that the corolla and stamen are inserted.

Stam. basi submonodelpha, et pilis cellulosis simplicibus brevibus immixta. Calyx fructifer connivens, calyptrata decidua. Corpuscula vel granula ultima pollinis motione *vibrante rotatoria* donata.

Points to be determined, whether the odd sepal is posticous, and the odd petal anticous. Whether the anthers are right and left, and into which one the style is received, and whether the column is curved in the young bud. It will also be important to examine the relations at this time closely ; especially the relations of the carpella. Is the odd one anticous or posticous.

Apostasia Pl. CCXXXII. Fig. II.

1. Bud.
2. Flower.
3. Perianth.
4. Column, one anther separated shewing its interior structure.
5. Column of bud.
6. Inner view of anther of ditto.
7. Pollen mass of ditto.
8. Portion of ditto magnified 1-35.
9. Transverse section of a bud more advanced.

The same Apostasia Pl. CCLXXXII. Fig. I.

a. Transverse section of anthers; *a* marking the groove for the style.

e. Posticous sepal, *f* its apex.

b. Intermediate petal.

j. Petal corresponding to the labellum.

c. Long section of ovary, *c* marking the canal communicating with the column.

h. Transverse section of the ovarium.

i. Partial long section of placenta.

d. Young ovula.

VANILLACEÆ.

1. *Vanilla rubiginosa.*

Aphylla ad articulos radicans. Spicæ elongatæ ex axillis squame, panicule simulante; bractea rigida carinata squamiforme cuique flor.

Flos. extus tomento-rubiginos. Ovar: (cum pedicello) post fecund. clavat. Placentæ 6, per paria approximatæ. Sepal: subæqualia lanceolata concava suberecta. Petala angustiora glabra.

Labellum ecalcar. indivisum, margine denticulato fimbriato, intus papilloso-tomentosum. *Calceolare.*

Columna clavata, clinandrium membranaceo-3-lobum, brevis.

Anthera ½ immersa, quam maxima cristata, pars loculifera refracta! biloculare. Stigmatis margo inferus bidentatus.

Ovarium subcalyculat.? dense tomento rubiginos. Squamæ crassæ conduplicato-carinatæ loco folior. his opposit.

Hab. *Malacca: Tabong.*

2. *Vanillæ* sp. Pl. CCLXXXI.

Ovarium glaucescens glaberrimum lævissimum cylindraceum, apice dilatato annulat. basi articulat.

Alabastro ambitu subovovato. Perianth. in apice ovarii dilatat. annulat. articulat.

Sepalis oblongis obtusis concavis *postica tertia* paullo minore æstivatione valvatis! especially of the two lower, in which the keel of the petal is not interposed, consistence succulent, fragile, but not breaking at the articulation because basibus omnia connata sunt. Petala conformia imbricata magis membranacea eodem modo apice subinflexa, venosa, centro conspicue carinata, carina inter sepala lateralis et postice interjecta and not by any means in an interior plane to them.

Labellum explanatum oblongum, when spread out subpanduriform plicato-fimbriatis, apicem bilobum, centro basi quasi bisulcat. The middle of the disc bearing a large ball of cotton, to which is applied a bilobed fleshy inwardly barbate body, and this application in the bud is elastic. The margins adnate to the column interiorly fleshy, produced inwards on each side into a hollow process, the circumferential tissue of the ovary is filled with raphides.

Columna basi arcuata labello marginibus antice sulcata, semiteres apice dilatata, expanded on each side of the anthers into a membranous rounded process with incurved margins. Anthers pendulous from the apex of the clinandrium. Pollen *simplex* læve? rotundatum.

Rostellum planiusculum quasi truncatum projecting over the lower edge of the stigma, which is a narrow transverse fissure, bounded above by the rostellum, below by a bilobed fimbriated border.

Caulis alte scandens, ad articulatam, incrassatis subsulcato-flexuosis ad articulos lateri radicul. emittent.

Fol. oblonga, elliptica acuminato-cuspidata, subsessilia basi ½ torta carnosissima coriacea striata, vena nulla cæteris conspicuosior, ob torsionem perpendiculi. Petiolus dilatatus canaliculatus semi amplexicaulus.

Spicis axillaribus fol. subæquantis plurifariis florigeris, densifloris, robustis cylindraceis. Bractea concava sublanceolata subcarinata subflor. quemque. Aliæ vacuæ breviores ad basin spicæ.

Floribus ascendent. patulis, inconspicuis viridescenti-luteis (expansos non visi.) Ovarium subrecurvum, post anthesin patentissimum, basin album, cæterum glaucum.

This is a remarkable plant altogether, with the aspect of certain Smilacineæ. Folior pagina infera stomatosa tantum oblique hanc causam torsionem pedicellam.

Perianth. sæpius labens interdum (ac ob fecundat.) marcescens, insuper ovarium columnaque nunc persistens. Ovarium e costatum! Placentis 6, lineari-angustis.

The valvation and inflexion of the calyx is remarkable, also the keel of the petals which is the only part of these not absolutely internal to the sepals, so also is remarkable the union of all these at the base.

The venation of the column shews, 3 fascicles for the stamens, three much smaller for the stigmata.

The placentæ are distant from each other, and although analogy would point out perhaps that these placentæ are the placentæ of 6-carpellary leaves, because in a compound fruit the placentæ are always compound, at least at their bases, yet it is by no means assuming any thing extraordinary, to suppose that there are only 3, because Cyrthandracæ shews that the placenta of a compound fruit may in reality be distinct, and it is easy to imagine such a carpellum, big with thickened backs, thick edges and the inflections of mucilaginous and milky leaves. There is less difference than usual between the tissues in opposition to either cutis, a transverse section shews none of the usual lacunæ ; granules, and raphides abound in the leaves.

The placentæ being 6, and bifurcated in Vanilla planifolia, *(see Bauer's Illustrations.)* it is difficult to understand how the ovary can be simply ternarily composed. In my plant they seem simple, and the only regularity is their being all separated from one another.

This is worth enquiring into, so far as I know the advocates for 6 carpella have not cited Vanilla.

Is there any instance known of the placenta of one carpella being bipartite?

One of the most constant and peculiar marks of Orchideæ disappears here, the pollen grains being quite simple, even at a rather early period, so with the costæ of the ovarium which are here totally wanting.

Yet in the labellum, column, and Anther-case, it is as Orchideous as any.

The articulation of the perianth, or the ovary, is exceedingly curious, being I think, unknown in other monocotyledons, because it is scarcely compatible with the hypothesis of ovarium adhærens; can it be analogous to the articulation of the stalk in Smilacinæ.

Vanillæ sp. Pl. CCLXXXI.

I. Plant natural size.
2. Bud laterally, *a* carina of petals, which is exactly on the same plane with the sepal.
3. Petals viewed laterally, shewing their imbricated æstivation, and the union of all the parts of the corolla at the base.
4. Petal back view.
5. Columna and labellum in æstivation, the terminal part of the lip is bent abruptly back.
6. Lateral view of the same, pulled out.
7. Front of ditto from the flower, after expansion, *a* the cottony ball, *b b* the two fleshly processes, barbate on the inner faces, with white processes, and elastically applicate to the cottony ball.
8. Apex of columna etc. in front.
9. Do. laterally.
10. Anther front.
11. Do. base.
12. Column apex of. Anth. removed and rostellum or anticous stigma pushed up to shew the stigmatic orifice.

13. Lateral of do. Rostellum in situ.
14. Transverse of ovarium.
15. Apex of pedicel.

ORCHIDEÆ.

General Remarks.

1. *Structura.*

Some light is thrown on the structure of orchideæ by the examination of a monster in Dr. Falconer's collection, *Dendrobeum normale* Falc. in which the lines, on the ovary mark out portions corresponding in number only with the petals.

The only remarkable thing connected with the perianth of this plant is the complete regularity. Sepalis et petalis æqualibus, illis minoribus. The column is remarkable, it is short, rotundate triangular divided at the apex into 6 divisions, of which the larger are subovate subcarinate dentiform and opposite the smaller petals. These also may be considered as really external, the filaments are subulate, supporting the anthers, the subulation and length varying and increasing according to the more or less perfect development of the anther.

The anthers are generally unequally developed, and even when three are developed so as to be polliniferous in a sufficient degree, one or two are smaller than the third. The largest being anticous, or that which in all the congeners is alone developed. Occasionally they are very abortive, in which case they are either reduced to the form of an ordinary anther at a very early period of its growth, or one cell is much the most developed. The Pollinia are Dendrobeous. The stigmata are remarkable, they are decidedly opposed to the stamina, and their perfection is in accordance with that of the stamina. Those which are opposed to such stamina as are more or less abortive, are ovate

bodies, with the upper and lower margins inflexed, those that are opposed to more or less perfect stamina, have no under margin, and the upper is developed into a subulate rostellum, the length of which varies as the anther is more or less perfect.

The ovary is normal, *i. e.* the sterile carpellary leaves are opposed to the sepals, the fertile to the petals.

The stigmata are, so to say, confluent, and the whole of the interior of the column below the upper communicating margins, is stigmatose. In one instance however the stigmata had caught pollen masses, and the result was the formation of two stout cords of boyaux, which did not however run straight down the interior of the column, but crossed obliquely over the stigmatic surface, immediately under the most perfect rostellum. In another case however, this predilection for a particular stigma did not occur.

The development of the rostellum is in a marked way proportionate to that of the stamen to which it is apparently opposed. The alternation of the parts are thus.

Sepals.
Petals.
...Stamina.
....Carpellary leaves, *i. e.* three series are opposed to each other with only one alternate series interposed.

But if we consider the broader teeth of the column to represent an inner series of stamens, we shall have the usual situation of parts. Thus.

1' Sepals.
2' Petals.
3' Stamina..........
4' Stamina................
5' Carpellary leaves...

This of course is casually considering the ovarium as tricarpellary.

This view agrees with what appears to be the general rule, that the carpellary leaves alternate with the inner-most series of stamina.

The constant correspondence of the most perfect stamen, with the most perfect stigma, that is so far as the rostellum may guide us, argues strongly in favour of their true opposition ?.

This instance proves that the most permanent parts of Orchideous structure, are the union of the filaments and style into one column, and the cohesion of the pollen grains into *threes* and *fours.* And it proves that in Vandea at least, an equally permanent character exists with the union of compound pollen grains into waxy masses of a definite number.

It would be important however to determine the vascular bundles of the column, their distribution, to explain the ovary, and to state what cases are known in monocotyledons of definite ovaria being more in number than the perianthial leaves.

Of the relative amount of permanence of the above characters, at present I can only speculate. If it be found that the irregularity of the present flower, which chiefly relates to the labellum, be of comparatively late date, we may assume that it will be the soonest to disappear. And if the quaternary or ternary aggregation of the grains be the earliest in date, it will be the last to disappear.

Besides this, the aggregation of the pollen grains is of almost universal occurrence in all families, and anomalies from arrest of development are, I am disposed to think, much more permanent than anomalies from excess of development?

Has the occurrence of dimidial or unilocular anthers, even though abortive, any relation to Cannean anthers?

In another instance in which two deficiently developed flowers had grown together, there was an apparent tendency in the labellum to assume the antheriform structure.

However easily this deviation from the usual Orchideous form may appear of solution, and however easily, judging from it, Orchideæ may be referred to a hexandrous type, the three innermost stamina being abortive, the hypothesis is

scarcely applicable to the Ophrydeæ, in the monstrous forms of which, four lateral processes occur, and apparently in extraordinary situations.

On this head Mr. Brown remarks. " For in this case, in which three anthers are formed, auriculæ not only exist on the middle or ordinary stamen, but one is also found on the upper side of each of the lateral anthers, which are here opposite to two divisions of the outer series of the perianthium.

Great light is thrown on the conformation of Orchideæ by the monstrosity of Habenaria bifolia, quoted by Mr. Brown,as casting great doubt on this hypothesis being applicable to these auriculæ of Ophrydeæ. " For" (Mr. Brown says) " in this case, in which three antheræ are formed, auriculæ not only exist on the middle, or ordinary stamen, but one is also found on the upper side of each of the lateral antheræ, which are here opposite to two divisions of the outer series of the perianth. It is evident here that there is a strong tendency to become hexandrous, the only doubt of the applicability of my idea to this monster, exists in the processes of the lateral stamina being on the upper side."

Epipactis in Bauer's illustrations t. 20 is well worth study, In fig. 6, I take the usual structure to be, one anther developed, with traces of other four, of which the two cellular bodies represent the anthers opposed to the two lateral sepals; the intermediate teeth, those opposed to the two lateral petals.

In Bauer's Epipactis, it is obvious that the only stamen unrepresented is that opposite the labellum.

In fig. 10. The same parts are visible, but the teeth opposite the lateral petals are antheriferous.

This is very remarkable, for the development is that in which the formation of cellular bodies indicates some proficiency, no greater regularity of the column appears to exist in these monstrous cases, than in the normal ones.

Now, what is the usual situation of these lateral processes in those genera in which they are of constant occurrence?;

are they opposed to the lateral sepals, or the lateral petals, or both.

With reference to the constitution of the ovary. I may mention that in Vanilla planifolia, according to Mr. Bauer's drawing there are obviously six carpellary leaves, but their relation to the perianth is not represented.

True Orchideæ however are barely explainable by assuming them to have an equal number of carpellary leaves, because as Mr. Brown has remarked, the situation of the placentæ is quite contrary to all analogy, if we take the smaller divisions to represent the three other carpellary leaves.

But Mr. Brown's arguments in favour of these divisions occurring as the first steps to a reploid dehiscence, is not conclusive, unless a similar tendency is traceable in the other orders in which Mr. Brown adduces the occurrence of other examples.

Can any thing be made out about the true structure of the ovary, by comparing the great variety in size between the supposed carpellary leaves in the different families. For instance compare them in Neottia and genuine Orchideæ with Dendrobeæ etc.

Can it by means be made out, that the lines on the ovary are analogous to those so distinctly characteristic of certain Vandeous genera. Vandeæ here include all with definite waxy masses.

In Epipactis the lateral flowers appear to correspond to the lateral petals. The line of union of the styles with the unilaterally dorsal mass of filaments is also apparent, as well as that between the styles themselves, of which the central is considerably the largest.

The only conclusion to which I was led by the examination of two or three columns of *D. normale,* was that the vascular bundles of the stamens were larger according as the stamens were more perfect, and that the bundles for the broader teeth were not of constant occurrence.

In one column the vascular fascicles visible on a trans-

verse section were four, of these, the two most distinct, obviously supply the two most distinct stamens, both of which were perfectly polliniferous. The two remaining were indistinct and belonged to what I consider an undeveloped stamen, with the sides of which they correspond, no axillary bundle existed, nor was there any appearance of one corresponding to the third stamen, which was exceedingly rudimentary.

In another instance however, as distinct a vessel as any in the column corresponded with one of the broader teeth, and terminated just beneath its apex. In this instance also the most rudimentary stamen was supplied.

In another longitudinal section of ½ a column the bundles were as follows, one for the perfect stamen, one ditto for its perfect stigma, one for a barren stamen, opposed to this was a short distinct bundle, one for an abortive one.

On the subject of the vascular distribution for the supply of the parts of the genitalia, I can say nothing with the requisite confidence.

Dendrobeum normale. Pl. CCLXXXIV.

1. Front view of flower of a metamorphosed Dendrobeum *D. normale* Falc.
2. Lateral of do.
3. Front view, several times enlarged.
4. Column, and upper end of ovary, bases of petals and sepals in situ., *a a* broader teeth of column, or the undeveloped stamina, *b* the perfect dorsal stamen, *c* one of the lateral ones, in an abortive state, *d d* the stigmata opposed to the abortive stamina.
5. The same column, the scar of attachment of perianth shewn, *a a* refer as before, *b* the most abortive anther, *c* the second one more developed.
6. The same, the two undeveloped stamina forcibly reflexed; at *a* the stigma opposed to the most abortive stamen *b*, is seen.

7. Vertical view of the same column, *a a a* the broader teeth, *b c* abortive stamina, *d* filament of posticous perfect one, *c c* stigmata opposed to the two abortive stamens, *d e* that opposed to the perfect stamen, and having a rostellar form.
8. Long section of column, *a a* broader teeth, *b* perfect anther filament of, *c* one of the lateral stigmata, *d* rostellum. This shews a tendency in the pollen tube cords to pass over to the stigmatic surface of the most perfect stigma.
9. Longitudinal section of another column, *a a* broadest teeth, *b* one of the abortive stamina, *c* filament of perfect stamen, *d* rostellum, *e e* lateral stigmata.
10. Abortive stamen *b*, of fig. 5.
11, 12. More developed do. 11 belongs to fig. 5.
13. Lateral view of perfect anthers.
14. Front of ditto.
15. Back of ditto.
16. Do. loculi somewhat separated.
17. Vertical view of an anther. Pollenia in situ.
18. Lateral view of do. Pollenia in situ.
19. Partium situs et alternatis.

In another monstrosity which Dr. Falconer seems to regard as intermediate between the above and the usual form of Dendrobium, some very remarkable facts presented themselves.

In this the lower division of the inner series is as perfectly labellar as in the ordinary forms of D. fimbriatum, and the column invariably limited, othewise it is a good deal like that of D. normale, the broader teeth opposed to the lateral petals being equally conspicuous. The number of portions of which the ovarium is composed, in one instance bore as marked a relation with the number of the divisions of the perianth. For in that case no lateral petals were developed, and the visible cords amounted only to four, of which the smaller ones referred to the labellum, the three larger ones to the petals.

To which variation is the greater amount of value to be ascribed? to the six carpellary structure of Vanilla, or the tricarpellary of Apostasia, in which last the carpellary leaves are opposite to the sepals?. Can the order of suppression enter in any manner into our notions of oscillation?

1. Sepals.
2. Petals.
3. Stam.
4. Stam. barren.
5. Barren carpells.
6. Fertile do.

One of the most conclusive arguments against the idea of the ovarium of an Orchideous plant being composed of 6, is the fact that no more than three stigmata have ever been observed. And on this head I may remark that the stigmata is the last portion of the carpellary leaf to become, so to speak, *absorbed*. We have many instances of an apparently simple ovary with more than one style or stigma, but no instance is known of a simple stigma existing with a really compound ovary.

From Mr. Bauer's drawing it would appear that in Apostasia the lateral stamens are opposed to the lateral sepals. If this is correct the stamina and the stigmata are really opposed to each other.*

1. Sepals.
2. Petals.
3. Stamina.
4. Carpella.

To what extent can the anomalous situation of the placenta be explained?.

It is not difficult or absurd to imagine a carpellary leaf with a very stout midrib, and reduced lamina.

Take away reduction in size of the cellular mass of a fertile

* The structure of the anther of Apostasia is worth examining.

Orchideous capellary leaf, and you reduce it at once to a not unusual type, such as occurs in Butomus etc.

Apostasia differs from Orchideæ in the extreme development of lateral stamina, and extreme suppression of the posticous one, which however barren it might be in Cypripedium, is nevertheless of large size. It also differs in the discretion of great part of the style, in the bilocular ovary, in the structure of the ovule and in the pollen in some species.

It is worthy of remark that the complete separation of the pieces opposite the sepals, is not universal. *See Bauer's Illust.* t. V. Dendrobii sp.

The section of Arethusa bulbosa, t. VII. fig. 8, is also in accordance with a pentandrous type, the sixth stamen being totally suppressed.

2. *Fertilization.*

The existence of a peculiar structure of the male organs has in this, as in many other instances, led to a particular theory of the mode of fecundation.

That theory has been subsequently to a great extent disproved, and this order together with Asclepiadeæ in particular, have afforded striking instances of the danger of constructing theories in a science of observation, on any other base than observation.

The peculiar characters of the male organs, in this family depend upon the close, and as it were, permanent aggregation of the particles composing the pollen, and of their attachment to a process, known to be of stigmatic origin, by a web of highly elastic structure, neither of these characters is strictly limited, although the first exists to a much greater extent than the second.

And the theory built upon these peculiarities, supposed that the elastic web above noted, formed means of communication by which the fecundating matter was enabled to reach the stigmatic surface. This theory was constructed at a time when we possessed no precise knowledge of the manner in

which fecundation was effected in plants of ordinary structure, but it agreed with the theory formed for those plants, in supposing that the chief agent was an invisible aura seminalis.

It has been since shewn by Mr. Brown, and M. Brongniart that the mode of fecundation in Orchideæ is similar to that which usually obtains, and which implies the necessity of the application some of the pollen, to a portion of the true stigmatic surface, the application being followed by changes of a peculiar nature in each particle of the pollen so applied, consisting in a protrusion of the inner coat of each grain, and its elongation, or penetration to a greater or less extent into the proper stigmatic or conducting tissue.*

This, which may be called the Bauerian theory, no longer accords with analogy: we have the strongest ground therefore for suspecting it to be inaccurate in all its details, for the parts to which it attributed primary agencies, would now appear possessed of secondary ones alone, though these are of high importance. It has still however some advocates, who think that its extreme peculiarities are not reconcilable to ordinary mode of explanation, and it therefore becomes worth while remarking how far this peculiar structure may be made fairly applicable to the new theory, which requires the application of the pollen-mass to the stigmatic surface.

Insect Agency.

The consolidation of the minute, usually almost ætherial distinct grains of pollen into two or more determinate masses, will be allowed to destroy the effect of the usual causes of application, the chief of which is the motion generally caused

* Mr. Bauer was the first person who saw the protrusion of boyaux, not only in this, but in families of ordinary structure. I have seen sketches by him made in 1799, which shew them in Orchideæ and some other plants. He is therefore to be regarded as the author of this theory. That there should have been a doubt on the subject, is only an instance of the value of noting with the pen whatever we sketch with the pencil.

by exterior agents, such as wind, but in some instances, dependent to a certain extent on the plant itself.

In a great number of plants with ordinary pollen, the slightest motion of the flower is sufficient to induce the fall of the pollen from the anther, and the application of part of it by reason of its highly divided nature, to the stigma. And in a great many plants, such as those with drooping flowers, and in which the stigma is longer than the stamens, this application almost necessarily must take place simultaneously with the dehiscence of the anthers, or in others the organs are so disposed, that provided the degree of development takes place, the application must follow. Of this Compositæ is a notable instance, and on this are partly founded the claims of this great family to a typically perfect development. But the separation of a mass, or of a few masses, from their situation, by such sudden agency as motion of the wind etc. would be destructive, almost inevitably, to the chance of fecundation, because the masses are determinate, and always few in number, and of considerable size. Secondly because the stigma is placed in any thing but a prominent position, indeed it is in a position which affords no facility to the catching of a falling body. Nature has not neglected to obviate this cause, which would be attended with such fatal effects, and has so tied down the pollen-masses to the female organ, that a considerable degree of force is required to effect their separation. It must be borne in mind that, when this separation has been effected, the pollen-masses, generally remain attached to the substance, or part, which has been the means of effecting it, by virtue of the viscid nature of the gland, or its processes.

This last circumstance points prominently to some agency of a crawling inquisitive nature, such as that of insects.

The fact of the gland having the same structure, and some of the properties of the stigmatic tissue, is worth noting, as it is the last to lose its situation when the masses are inclined to fall forward, into, or near the stigmatic depression.

To assist in this, the viscous gland and its processes, but more especially the former, are placed on the most prominent part of the column, a part which must be passed to enable the insect to reach the bottom of the flower, its invariable aim. And perhaps in unison with this, is the frequently cucullate nature of the labellum.

The situation of the stigma, and its form, being in fact nothing but a pit in the face of the column, lined with viscid tissue, may be argued as in part assisting to this end.

However unphilosophical the supposition of the necessity of the agency of insects may be, in as much as it appears to argue imperfection in the plant, and that too of a high degree, yet it is not so unphilosophical in its assumptions as the first theory. Besides it has analogy of the strongest nature in its favour, and viewed even in its imperfection, it is a beautiful instance of the mutual dependencies evinced in the works of natnre. But the idea of imperfection disappears when we keep in view the simple resources by which nature overcomes her difficulties. The plants of this family present very generally the most beautiful flowers, striking in their colours, and often even assuming the peculiar shapes and forms of insects, as if the better to attract them etc. On this point I quote from Dr. Lindley who has paid great attention to the family. "Orchidacæ are remarkable for the bigarrhe figure of their multiform flower, which sometimes represents an insect" etc. p. 337. Nor is the motion of certain of their flowers on the application of a stimulus to be omitted, as calculated to promote the kind of agency adverted to.

Lastly, the inflorescence is almost always of a form, by which contact with one flower, leads almost certainly to contact with others.

On the other hand the Bauerian theory involves many circumstances of a contradictory nature.

In the first place it errs against general analogy in supposing that impregnation takes place generally before the opening of the flower. In the second place it takes no account

of the frequent failure of the occurrence of fecundation, a failure almost necessarily attendant on secondary agencies, such as that of insects, and particularly remarkable in this instance, because if the Bauerian theory were true, then impregnation should occur to the greatest possible extent. Thirdly, it is not very compatible with the structure of the stigma, which indeed is a needless development. Fourthly, those instances are not explained in which no glands or processes exist, and in which the masses are not in direct communication with the stigma.

With the other theory, the objection presented by these circumstances is not so strong beause the masses themselves will adhere to any thing with which they come in contact, though not so readily or firmly as in the other cases.

It has been urged that in some cases the difficulties presented to the insect agency of impregnation, are so great that the probability of its success cannot be admitted. But the case has been proved with regard to Asclepiadeæ, in which, no part of the stigma is exposed, but the mass has to be pushed into one of 5 small chinks, barely capable of admitting the point of a pen-knife. The sides of the anthers, which form these chinks are besides of a hard unyielding texture. But difficult as must seem the task allotted to the unwilling insect, it is incomparably farther increased in Asclepiadeæ, from the fact that one side only of the mass is capable of being acted upon by the stigma, this side presenting no particular facilities for gaining admission within the chink.

In these remarks we must not omit to notice the facilities presented for dispersion by the structure of the seeds, and those for securing a number of individuals from one partial fertilization, by their number.

In *Eulophiæ* sp. Pl. CCLXXXV. Figs. II, the column is excessively short, and its anterior face is quite occupied by the stigma, the anterior margin of the clinandrium is bifurcate, and the tips of the forks which are flat are reflexed, are in firm contact with the glandulæ, which are very minute. Sooner

or later the pollenia will be found in contact with the stigma, this I find to be invariably the case.

The change induced is a dissolution of the mass, and its resolution into its component particles, this is not carried however through its ultimate component particles, which remain adherent. The pollinulæ first applied are those first dissolved. The stigmatic canal now consists of a few loose cells, with, or without central nuclei, and a vast number of excessively fine threads, these threads passing down the canal are at the origin of the placentæ divided into three bundles, which bifurcate at the apex of the placenta, and run down either side, and which are with ease pulled out from these, by gentle force. Are these the boyaux? this question. I cannot determine, by demonstrating their origin with $\frac{1}{20}$ simple lens, the last are barely demonstratable as they do not exist before the application of the masses to the stigma,and as their proportion is proportional to the amount of resolution, their origin from the granules is assumable.

Seeing that the rostellum is highly elastic, this is a fair question to put, is not the elasticity connected with impregnation, by being attended with the effect of causing the pollenia to be dragged into direct communication with the stigma? For in this plant we have without aid of our foreign agency, the mass gradually disengaged from the anther case, and at length lodged on the face of the stigma.

I have not traced any application of the tubes to the ovula: although they are intimately mixed up with them.

Eulophiæ sp. Pl. CCLXXXV. Fig. II.

Sketched from drying specimens from Pushut; the flowers in which impregnation is not effected are dried.

1. Column viewed in front.
2. Same laid open, the whole canal occupied by excessively fine tubes, scarcely definable by $\frac{1}{20}$ inch lens

these tubes do not appear unless application of the pollen, to the stigma takes place.*

3. Represents pollen grains, and boyaux with the nucleate diversiform cells of the stigmatic canal; there is a very great resemblance between the smaller cells of the stigmatic canal, and the pollen grains while undergoing their first changes, the difference being chiefly in the brown substance in the grains forming the outer coat, while in the cells it forms an inner nucleus.
4. Represents portion of a placenta, the ovules are not sphacelated, but the placenta is. This is to correct the placenta in fig. 2.

The division of the mass of tubes into 6 viz. two at the apex of each placenta, is indistinct, in the figure it appears distinct, but the layer of tubes which is thick, has split upwards.

From this plant, some facts fatal to the Bauerian theory are assumable. First the application of the masses to the stigma is so general as to be as universal as the usual chances of failure will allow it to be. Secondly the steps in the two functions are so different, as not to be recognisable, for we have no instance of an important function being carried thro' by two means of a totally different nature. However different such means in some cases may appear, they are always modification of each other.

Then again the whole organization is opposed to it; where would be the use, granting it to be true, of a wide passage of communication filled with loose tissue between the stigma and placenta. The communication is at its maxima of development so that in Orchideæ, whatever the difficulties in the

* The ovula of Eulophia appear very little developed even when the tubes have reached the ovarium, and resemble precisely ovula of Dicotyledones before the appearance of their integuments. They seem to be in fact nothing but cellular productions from the placentæ, some however look much like matured ovula, but my microscope defines very badly, the usual form of this.

way of application of the pollen to the stigma may be, its effects are much diminished by the ease with which the subsequent operations are completed; vide Mr. Brown's remarks. Again how is the universal presence of the placental chords and their invariable bifurcation so as to supply each side of the placenta, explainable.

In Dr. Lindley's Introduction 2nd Edition, the Bauerian theory is adopted: moreover, it is given in the essential character, in which nothing that is not proved by observation, should ever be admitted. In the commencement of the 1st Paragraph after that of Affinities, the description of the stigma will be found, and it is stated that it is through a of *"callosity"* that the fecundating matter passes into the tissue communicating with the ovules. On this I have only to remark, that the passage of the fecundating tube invariably takes place through the softest tissue of the vegetable organization. And that in Orchideæ, this tissue often consists of elongated cells *imbedded* in mucus? So that the passage through a callous point is not only contrary to analogy, but involves the necessity of two sorts of tissue of communication, of a diametrically opposite nature, one of which too, may be considered as the type of ordinary stigmatic tissue.

The phenomena of impregnation cannot be too often observed in this family, in which there occur several distinct modifications of the pollen, all well worthy of minute study in connection with the form and situation of the female organ.

If complication be, as I believe it will be found, a sign of perfection, Orchideæ are the most perfect of monocotyledonous plants. They form a most natural family, and one of very great extent, their applicabilities to diversities of climate and situation are very great.

They present a decided analogy with Dicotyledons, in the articulation of their leaves, and the *hard texture of these.* The almost universal irregularity of the perianth, may also be considered as a sign of perfection,

In Eulophia Pl. CCLXXXV. Fig. III., before the application of the pollen to the stigma, no tubes are to be found in the stigmatic canal, which is highly developed. The specimens examined were dried, except the impregnated ovaria which remained nearly fresh. In this plant the ovula are situated on two distinct lines, but after impregnation they present a confluent mass.

Neither in this, nor in the species represented Fig. II. of the same Plate, have I seen the tubes attached to the ovules, but I am led to believe that this does not take place until a comparatively late period, the ovula not having reached a sufficient state of maturity. If this is the case the maturity of the ovula themselves is in some cases dependent on impregnation, on the farther investigation of this point we keep in mind those plants which have very young ovula at the time of flowering.

Shews the genitalia of this *Orchideous genus.*

1. Back view of Pollinia.
2. Front ditto.
3. Caudiculæ sketched out and the gland which is of a peculiar form, and hard consistency.
4. Clinandrium etc.
5. Column and pollinia in situ.
6. Do. pollinia reflected to shew the insertion of the cornua of the gland into a space between the bed of the clinandrium, or rather of its outer portion and the rostellum, which is as usual *inflectile*, and in this instance very broad.

In a case like this in which so intimate an union by contiguity takes place between the gland and the rostellum, which is certainly stigmatic, impregnation must almost necessarily take place, if there is any truth in the Bauerian theory.

3. *Affinities.*

Orchis commelinifolia. The only real difference between

Habenaria and Cynorchis flavescens, is, that in the latter the caudicula is a long flat rostellum; in Hebenaria, it is a long canal formed by the convolution of the rostella. The divisions of Mr. Lindley are certainly unequal in value, consequently they cannot fairly hold the same rank. Thus Epidendreæ, Bolbophylleæ, and Vandeæ, are much more united with each other, or differ much less from each other than they do with those tribes represented by Orchis, Spiranthes, and Epipactis. In fact they differ only from each other in the degree of development and suppression of the separated portion of the stigma, *i. e.* the gland and caudicula; while they differ from the others very much in the organs of vegetation, and in a deficient degree of consolidation of the grains of pollen into distinct waxy masses.

The claims to separate rank of the three first among each other, can only amount at the most to their being sub-divisions of a division. Vandeæ probably are the most complex. The cause of incumbent pollen-masses requires to be explained; accumbence is in accordance with what we know of the direction of division of an anther; but in incumbence the principal secondary longitudinal septum is wanting. Whatever amount of imperfection may seem to us attributable to the necessity of foreign agency to ensure fecundation, is sufficiently compensated by the admirable adaptation of the pollen masses, and the whole apparatus to that agency, by the immense number of ovula, and by the powers of the life in the individuals, which in very many is certainly great. We may fairly attribute more importance to this last circumstance, since there is no instance of a formation requiring foreign agency occurring in any plant of distinctly limited growth, except perhaps Rafflesiaceæ ?

What is perfection among one set of plants, may be imperfection or aberration in another; the most striking instance of this occurs in Leguminosæ, Sect. Minoseæ; in which we not only have regularity of corolla, but gamopetalism.

The approach to regularity of corolla in the Family alluded

to, takes place in Cæsalpineæ. The Mimoseæ are also aberrant in hypogynous indifinite stamens, an approach to which occurs, in a Pongamia, in which the hypogynous cup is 10-dentate.

Orchideæ are the most complex, and the most perfect of Monocotyledons. They are complex in their typical forms, in foliation, complex in their pseudo bulbs or reservoirs of nutriment, complex in resembling Dicotyledons in being capable of division, for each pseudo bulb may be regarded as a distinct individual, complex in their high degree of petalism, and in the irregularity of their envelopes, highly complex in their gynandrism, complex according to Mr. Brown in the ratio of suppression, highly complex in the function of fecundation, complex in the female structure generally, complex generally in the anther, and simple only in the pollen, that is—so far as its ternary structure is considered,* but complex in the fruit, and complex in the seed.

Perfection increases, simplicity diminishes with growth. In this regard, vegetables are as much subject to a law of progressive development as animals. As an animal fætus in the degree of its organization passes through stages typical of the grand zoological divisions, so do plants pass from a Cellular, into a Monocotyledonous structure, and attain their term of perfection in Dicotyledons.

This is most manifestly shewn in the embryo. The relation to Endogens occurs when the embryo is undivided, and also additionally in the loose structure of the parts generally, during the earlier periods. And this may prove that singularity of cotyledon, is the most permanent character among Endogenous plants.

* Otherwise, except in the most imperfect forms, the pollen is highly and unequally complex no instances occurring elsewhere of ternarily united grains consolidated into waxy masses, or union by three or four to the grains—the sole essential character, hence this union ought to occur only in those Apostasiæ which by having a *third stamen* approach most to Orchideæ.

I have often been struck with a remark by Lindley and Hutton elsewhere referred to*, that Monocotyledons are as perfect, if not more perfect, than Dicotyledons. Such an assertion is however contrary to one of the most universal truths, viz. the gradation of forms which this distinguished author himself advocates in the circular theory of natural affinities, a theory which reposes as it were upon the basis of a due gradation of form.

Premising that our ideas of perfection are of course only comparative, it is easily shewn that Dicotyledons are more highly organized than Monocotyledons, both in their organs of vegetation and reproduction. With regard to the former, we have Monocotyledons, and more especially their so considered types of perfection, Palms, limited in their growth to one point, and limited probably in the duration of life ; and although we have their leaves presenting some analogies to those of Dicotyledons, especially to their coriaceous structure, they are in all cases deficient in complexity arising from compound structure of their articulation with the stem, *and hence* their *perfection*. And with regard to their reproductive organs, we have only a relative perfection in their vast number, and produce ; this is probably to compensate for their vegetative deficiencies ; we have no complexity of envelopes, no irregularity, but as in most other Endogens, an undeviating adhesion to a ternary number and an extremely low degree of petaloid development. Again with regard to the fruit, we have the development by no means carried to a late, *i. e.* a *high* point, for this would give a highly developed embryo, and a small developed albumen.

There is no greater proof of simplicity of structure than that of regularity, hitherto supposed to denote perfection, for we find it in all cases of great complexity, an invariable accompaniment of early growth.

* Palms of Brit. India, Calcutta : 1850. p. ix.

Herminii sp. Pl. CCLXXXV. Fig. I.

1. Side view of flower.
2. Front of ditto.
3. Side view, sepals removed.
4. Back view of column and labellum.
5. Front view of column, a base of labellum, *b* stigma, *c* floor of clinandrium and its furcation into a rostellum, apices of the forks turned up and in union with the glandulæ, *d* pollinia just emerging from the anther, *e* sterile stamina.
6. Front view same pollinia removed, the same letters have the same reference.
7. Lateral view of a column, the pollinia are now quite disengaged from the anther, as they will always be found to be at some period, the same letters &c.
8. Front view more advanced. The stigma is tumid and choked up with the pollinia, which are in a state of dissolution, the stigma has a tendency to sphacelation, *d* remains of the pollinia.
9. Pollinium.
10. Partium situs et alternant.

I omitted to note whether the gland at length loses its adhesion with the rostellum.

In this the two processes appear opposed to the lateral petals, although the reverse is represented in the diagram no. 10. If they are opposite, the fertile stamen obviously belongs to a very different series. I have yet to examine this species closely.

Pl. CCLXXXIII.

Fig. 1. *Platanthera biflora.* Flower, section of column, the anther and pollen mass detached.

Fig. 2. The same parts of *Aceras anthrophora.*

Figs. 3, 6. The same of *Gymnadenia conopsea.*

Fig. 4. The same of *Calanthe veratrifolia.*

Fig. 5. Column and anther of *Habenaria biflora.* From specimens in Kew garden, 1829.

Pl. CCLXXXIII. A.

Fig. 1. *a* Woody fibre, *b* one of the vessels from the central hard part of the root of an ærial orchis.

Fig. II. *Dendrobium aloefolium*, Sept. 1829.

Fig. III. *Cyrtopedium Andersonii.*

Fig. IV. Column of Cattleya.

Fig. V. *Oncidium altissimum.*

Fig. VI. *Epidendrum*, 1832.

Fig. VII. *Neottia speciosa*, 1832.

Fig. VIII. *Cheiloglotis diphylla*, 1832.

Fig. IX. *Spiranthes autumnalis* 1832. The four last from specimens in the *Jardin des plantes.*

Fig. X. *Listera ovata* from specimens in Kew garden, 1829.

MICROSTYLIS.

1. *Microstylis.*

Epiphytia cæspitosa. Pseudobulbis 4-5 foliosis ovatis, vaginis latissimis foliorum arcte vestitis. Fol. linearia, acuta, latitudine semiuncialia, repanda, I-venia subtus basin versus *nervo* medio carinata, *lutescentia virida* ut tota planta.

Racemis terminalis folia excedente duplo fere basi ancipitis bracteate, bracteis lanceolatis basi cordatis acuminatis semiamplexicaulibus 1-nervis, in parte florifere sulcato-angulato: flores numerosi, postice in pedicellis filiformibus lóngiusculis bracteus paulo excedentibus, primo rectis demum ad ovarii basin subgeniculatis, minute lutescentes.

Perianthium explanatum. Sepala æqualia oblonga obtusa, postico ascendente lateralibus mutuo approximatis, patentissime marginibus revolutis ita ut dorsaliter approximato sunt.

Petala linearia angustissima pariter revoluta et apices versus reflexa. Labellum carnosum cum columnæ basin continuum, oblongum obtusum basin versus utrinque auriculatum, sinu an-

gustiusculo profundo, potiusve lateraliter basi obsoleto-biloba disco ibidem clavato-curvatum quoad margines gerent. Secus medium limbo concavum cum columnum subparallellum.

Columna erecta antica, sepalis subduplo brevior antica marginata alata, ala media versus processum setaceum deflexum tenuissimum gerente, apice rotundula edentata. Anthera postice affixa, terminalis, opercularis, simplex, apice depressa quasi bilocularis, loculis obsoletissime bilocillatis, longitudinaliter dehiscentibus.

Pollinia 4, obovata plano-convexiuscula per paria collateralia, lævissime cerea. Rostel. acute apice viscoso cohærente materia propria pulverea nulla, subcitrina.

Hab.—Legi in Querci specie, *Mumbree: November 9th*, 1835.

Obs.—Flores initio virides, demum fusco lutei labelli basis tunc aurantiacea. Sepalorum apices subcucullato in alabastris introflexi! ita ut petala sed obsolete, ambo sed præsertim *illa* cellulis spiralibus abundanter donata.

2. *Microstylis?*

Erecta pedalis sesquipedalisve, spica densiflora, floribus subsecundis minutis herbaceis; bractea ovata acuminata, ovario breviore. Sepala conniventia ovatia obtusa, æqualia. Pet. minima lanceolata. Labellum herbaceum planum, lineari-oblongum, apice 3-lobum. lobis linearibus lateralibus incurvis, intermedio nano, columna nana. Anthera nondum visa.

Hab.—In graminosis *Churra: October 15th*, 1835.

Oberonia.

1. *Oberonia anthropophora.*

Rhizomata simplicia? Foliis equitantibus ensiformibus carnosis, obtusis eveniis, junioribus apicibus setam tenuissimam gerentib. Spicis filiformibus sulcatis, foliis longioribus basin versus sterilibus; floribus in verticillis sub obliquis dispositis, minutis summis primo expansis ideoque in-

florescentia inversa. Bractea 1 cuique flora, lanceolata, apice setacea ovarium excedente, summis brevioribus, infimis sterilibus in setas longissimas abeuntib. Perianthium explanatum herbaceum. Sepalis ovalibus concavis subæqualis antico erecto lateralibus arcte reflexis ovarioque superimpositis viridiscent, pubescentia concoloria. Pet. linearia obovata, erecto-patentia. Labellum posticum cum columna basin continuum, ad basin subcallosum 4-lobum, lobis lateralibus setaceis, deorsum arcuatis, terminalibus lineari-subulatis, paulo divergentibus miniato-sanguineis. Columna nana sub 4-dentata, dentibus anticis majoribus, intermedia centrale o. Anth. terminalis aristata, 2-locularis. Pollinia 4 per paria cohærentia, accumbento-incumbentia, oo—oo. interioris cujusque paris minus.

The pollinia in their early stages are nearly vertically accumbent, they subsequently however become more incumbent than accumbent. Pollinia 2 solida pyriformia.

Hab.—Epiphytica in arboribus. Mergue: *Merg. Herb.* 718.

2. *Oberonia trilobata.* Gr.

Caulæ abbreviatæ pendulæ 2-3 uncialæ. Fol. disticha equitantia sub 3-juga cum impari, e sinu cujus spica erumpit, infima squamiformia, ensiformia carnosissima, pedalia vel ultra, acuta, tactu rigidiuscula. Spica teres subclavata, in parte florifera incrassata folio proprio excedens, per ⅔ longitudinis dense florifera.

Bracteæ infimæ vacuæ spicæque adpressæ membranaceæ denticulatæ: florum convolutæ potius involutæ, ovar. paullo excedentis denticulatæ, præsertim apices versus sed vix fimbriatæ.

Axis florifera excavata, excavationibus oblongis subverticillatis singulis unifloris. Flores dense dispositi, pedicellis brevibus ovarii longitudine, concoloribus nempe fusco-lutescentibus, postice minuti, infimi tardius evoluti, spicæ floratio nempe inversa, fusco-lutescente. Sepala ovalia arcte reflexa integra.

Pet. reflexa et idem longitudine paullo angustiora denticula.

Labellum planum 3-lobum, lobis lateralibus rotundatis petalis subsimilibus, terminalibus late subobcordato sinu profundiusculo denticulato, *basi concavum.*

Columna nana. Anthera membranacea. Pollinia 4, cerea per paria accumbento-incumbentia vel oblique incumbentia.

Labelli loborum lateraleum callosi. Rostellum acutum elongatiusculum. Bracteæ albo-maculatæ.

An Oberoniæ iridifoliæ diversæ, folia juniora glaucidina tecta, capsulæ ovatæ acutæ 6 costatæ.

Hab.—Epiphitica in arborib. Near Nowgong in the Khasyah hills 18*th Nov.* 1835. *Assam Herb.* 269.

Obs.—The Pollinia in their early stages are nearly vertically accumbent. They subsequently however become more incumbent.

3. *Oberonia iridifolia.* Lindl.

Caulescens, epiphytica in Eugeniæ speciem.

Fol. infimis basilaribusve minutis 2-4 uncialibus, ensiformibus subfalcatis. Racemo parte nudei foliis breviora, cæterum excedente, basi compresso vix ancipito.

Floribus in verticillis numerosissimis dense congesto caudam simulantibus auraniaceis spica ut in omnibus aliis speciebus mihi visis ab apice ad basin florescenti. Bracteis membranaceis lanceolatis fimbriatis ovarium paullo superantibus, floribus posticis sepalis oblongo rotundatis reflexis. Pet. *levioriter* reflexa conformia integra.

Labellum basin subplanum, carnosum, quadratum 4-lobum, lobis lateralibus rotundatis: terminalibus quasi obreniforme sinu nempe latissimo, lobis oblongis etiam rotundatis. Columna nana. Anth. alba membranacea bilocularis. Pollinia 4, cerea aurea interiora, minora incumbentia, ut in omnibus aliis mihi visis ope materiei lucidæ (rostelli secretione ?) cohærentia.

Semina oo, minutissima placentæ centrale. libera ? affixo

oblongo-ovata, extus papulosa viridia, nucleo central brunnescent.

Hab.—*Churra: October* 26*th*, 1835. *Assam Herb.* 173.

Oberonia iridifolia. Var.

Foliis 3-5 uncialib. acutis, carnosis, subfoliatis luteo-viridibus. Spica oblonga basi dilatata ancipita subbialata, squamis linearibus paucis, floribus densissime imbricatis. Bracteis lanceolatis membranaceis, inciso-dentatis subciliatis capsulis ovatis obtuse 6 costatis.

Sp. distinct. progenere maxima. Spicæ fructiferæ et ante anthesin tunc vere Myuroides, tantum visia.

Hab. in Lagerstræmia regina.

4. *Oberonia crimicina Gr.*

Caulescens, 3-4. uncialis. Caulibus ancipitibus simplicib. Fol angustis linearibus acutis subfalcatis. Racemis terminalibus, nutantibus, folia excendentibus. Floribus verticillatis sæpius pluraliter dispositis brunneo-miniatis. Bracteis lineari-lanceolatis acuminatis longitudine pedicellorum, subintegris.

Sepalis ovatis, patento-reflexis, minuta reflexis quam in O. *anthrophore.* Pet. subæqualia, denticulata cum sepalis pallida et fusco-miniata. Labellum 4-lobum-lobis lateralibus, profunde 3-4 incisis, laciniis lineari-setaceis, lobo medio elongato, laciniis omnibus denticulatis saturatius præsertim ad basin coloratum. Pollinia 4 incumbentia.

Hab.—Epiphytica in Lagerstræmia Moulmein in humidis, Variat. foliorum latidudine. Bractiæ deciduæ capsulæ abbreviatæ 6 angulatæ. Merg. Herb. 772.

5. *Oberonia spiralis.*

Spira continua vel interdum in verticillos veros dislocat. scapis sulcatis, floribus arctissimo confertis.

6. *Oberonia acaulis* Gr. Pl. CCLXXXVI. *Itinerary Notes p.* 76, *Bootan Herb.* 1130.

LIPARIS.

1. *Liparis rupestris* Gr.

Terrestris vel potius rupestrus. Pseudo-bulbis post anthsin evolutis, obpyriformibus, vestigiis foliorum arcte vestitis, scapisque reliquis terminatis, basi hinc soboliferis.

Caule brevissimo unifolioso, basi folio abortiente, vaginæforme laxo stipato.

Fol. petiolo unciali convoluto-concavo, limbo, latiusculi-cordato, acuto repandiusculo, lucido glauco. Scapo spithamæo, sulcato angulato alato. Bractiæ minutæ lanceolatæ carinatæ aliis carinis decurrentibus ortis, pedicellis multo brevioribus persistentibus. Flores parvi, inconspicui resupinati, herbacei.

Perianthium explanatum. Sepala patentissima linearia convoluta (nempe revoluta) postico reflexiusculo, lateralibus paulo majoribus porrecta, et labello subimpositis. Pet. reflexa linearia angustissima, marginibus revolutis. Labellum porrectum oblongum subintegerrimum membranaceum venulosum cum columnæ basin continuum planum ecristatum. Columna basi antice gibba quam maxime arcuata, semicirculum fere definiens, semiteres apice clavata, et utrinque marginata. Clinandrii margo subintiger clavatus. Anthera terminalis opercularis decidua, mobilis, bilocularis, loculis discretis longitudinaliter dehiscentibus. Pollinia vix vidi, an 2 coalita hinc sulcata, an incumbentia.

HAB.—In rupes, *Nunklow: Nov.* 15*th* 1835.—*Assam Herb.* 257.

2. *Liparis.*

Pseudo-bulbis ovatis vestigiis foliorum vestitis 1-foliosis Fol. oblongo lanceolato breve petiolato replicato 1-venio, acuto. Racemo terminali, e sinu folii, basi ancipit. ut etiam per totam partem florifer. Bracteis subulatis persistentibus, ovarium subglobosum pedicellumque subæquantibus.

HAB.—In rupibus, *Surureem Khasya Hills*: *Nov.* 2*nd* 1835.—*Assam Herb.* 186.

3. *Liparis luteola* Lindl. *p.* 32.

Spithamæa cæspitosa. Pseudo-bulbis rotundato-depressis, apice foliosis, fol. infime. vaginiformis. (2 suprema, in plantis majoribus tantum) lineario-acuta, patento-recurva. Racemis terminatis paucifloris, bracteatus, bracteis lineari-carinatis, pedicellis brevioribus. Pedicelli ½ uncialis; flores antice parvi subsecundi.

Perianthium explanatum. Sepala linearia petalaque duplo angustiora patento recurva, subaurantiacea. Labellum anticum recurvatum integrum, obovato-spathulatum viridescens, basin versus 3-callosum. Columna curvata semiteres, basi lata antice postice, stigma prope marginat. Anthera terminalis fere omnino immersa, bilocularis. Rostellum acutum Pollinia 4, per paria accumbentia, obovata, faciebus accumbentibus plana, subæqualia. Capsula subobovata, 6-costata.

Hab.—In humidis vel aquosis *Churra* : *October* 13*th*, 1835. —*Assam Herb.* 142.

4. *Liparis bidentata* Gr. Pl. CCLXXXVI. Figs. II.

Epiphytica. Rhizomata crassitulum pennæ cygninæ lævis, reliquis vaginarum vestit. Pseudo-bulbis obclavatis basi squamis vaginantibus imbricatis tectis, sursum in caulem brevem compressiusculàm attenuatam, fol. sub 4, oblongo-lanceolata sessilia, apice oblique emarginata, coriacea venosa, v. tribus interioribus distinctis. Spicæ axillares hinc illinc squamatæ, brunneo-pubescentes, extra axillares. Nempe per basin vaginam extrorsum erumpentes.

Alabastra quæ per juniora tantum vidi postica, antica convexa, postice plana, dense brunneo-pubescentia. Sepala carnosa concava æstivatione valvata lateralis basi subobliquе. Pet. intus albo-pilosa glabra, subobovata concava. Labellum cum columnæ basi articulatum late obovatum, obtusiusculum apicem versus et intus barbatum integrum basi utrinque subauriculatum. Columna clavata sursum ampliata. Stigma transversum sub antheram.

Anthera terminalis opercularis, mobilis, bilocularis in loculis bilocellatis. Pollenia. 4.

Columnæ basin sursum flexa. Labellum hac parte articulatum, clinandrium profundum postice bidentatum.

HAB.—In arboribus in collis, *Naga* dictis *March*, 12*th*, 1836.

OBS.—Vix dubito quin sit Sectionis Dendrobeæ et Lipari proximum genus, si non congener. *Assam Herb.* 428.

5. *Liparis bootanensis* Gr. Pl. CCLXXXVII. *Itinerary Notes p.* 98 *Bootan Herb.* 1460.

OTOCHILUS.

1. *Otochilus lancifolius,* Gr. Pl. CCLXXXIX.

Scandens et epiphytica in arboribus.

Rhizomatibus apice oblique proliferis ideoque subarticularis (sub cylindricis articulis) strangulatis; interdum moniliformibus, bifoliis, foliis lanceolatis breve petiolatis, repandis acutius culis venosis. Racemis terminalibus, et e sinuum foliorum, vel terminalibus et lateralibus; infra medium penduli et bracteis imbricata, concavis comosis (quorum infimis brevioribus et latioribus) convolutis, floribus posticis quoad plantæ axin, majusculis, albis bracteatis, bracte membranacea carneo-fusca pallido cito soluta sed obconvolutionem tardius labente.

Pedicellum breve ovarium fuscum.

Per. explanatum. Sepala oblongo-linearia acuta unciata concava repanda alba, vena media basin versus fusca.

Pet. linearia a medio revoluta angustissima.

Labellum basi gibbum et cucullatum basi fusco-rubrum, 3-lobum, lobis lateralibus sublanceolatis subrevolutis ratione terminalis unguiculata, cuneato-elongata, acuminata deflexa minima.

Columna elongata semiteres clavata, apice marginata fusca omnino ut in Cælogyne. Rostellum deflexum longum acutum Clinandrium superficial. Stigmatis marginis elevata. Anthera longe rostrata et clinand. insuper. incumbens, bilocularis terminalis membranacea.

Pollenia 2 accumbentia ovalia compressa, intus foveolata, in caudiculam pulveream lutescens longis. ensidenta. Glandula parva diaphana linearis. Caudicula apice bipartita polliniaram fundaram foveolaram affixa.

Ovarium ovatum coriaceum, acute 6-costatnm, loculi antheri in rostrum per totam longitudinem product. Alabastrum inferne quad axin plantæ convexum, superne planum. Lobis lateralibus secus margines rependa.

Hab. In arboribus. Surureem. Nov. 2nd, 1835. *Assam Herb.* 181. And *Itinerary Notes* p. 69. Khasyah Herb. 1074.

Obs. Racema flexuosa geniculata, articulis rhizomatis ampullaceis. Pollenæ 4, glandula nulla acumbentia, interne foveolata.

Anthera longitudinaliter dehiscens.

2. *Otochilus latifolius* Gr. Pl. CCLXXXVIII. *Itinerary Notes p.* 75 *Khasyah Herb.* 1130.

ANDROGYNE.

Androgyne Sp. Epiphytica in arboribus, dense cæspitosa. Pseudo-bulbo obovata subampullacea nudiuscula, venis reticulata, diaphana 1-folia, fol. breve petiolata, oblongo-lanceolata, acuminata, venosa subplicata et subrepanda. Recemo radicalis nutantis pluriflora, foliis brevioris basi bracteis, binis, membranaceis, distichis stipat. bractea flori cuique.

Perianthium explantum celuloso-membranaceum.—Sepala oblongo-linearia postica ascendentia recto basi repando columnæ parallelo, obtusiusculo, vix carinato, lateralibus carinatis, acutis, medio ½ tortis basi subobliquis, gibbosisque: supra compressis.

Petala breviora oblonga, linearia, basin latissima, et postice in super columnæ basin convoluta, vel incumbentia, *venosa,* utrinque columnæ applicita.

Labellum cum basin columnæ continuum, ungue teretius-

culo, sigmoideo-flexu, longa, lamina angustissima integerrima, linearis, cum columna parallela, ob deflexionem inter sepala lateralia, consistentia fere sepalorum basi laminæ versus maculo-mauratiaceam cæterum album.

Columna recta, antica semiteres apicem versus alata (ob hoc spathulata) margine alæ denticulata : stigma bilobata ! lab. inferior deflexo, superior clinand. recto-rotundato.

Anth. terminalis opercularis postice affixa bilocularis, obliqe longitudinaliter dehiscens, loculis obsolito-biloculatis. Pollenia 4, per paria incumbenta obovata planuiscula, ope materia pulvere cohærente glandula ferea mentiente.

Hab. Legi apud Membrae in Querci cum Microstylis et Oberoniæ sp. Dendrobio flexuoso mihi etc, læte vigentem. Nov. 9th, 1835. *Assam Herb.* 233.

Obs. Genus proprium an cum Cælogyne parviflora consociandum.

Cologyne.

1. *Cælogyne barbata* Gr. Pl. CCXCI. Fig. 11.

Rhizomata repente. Pseudo-bulbis, lævibus glabris nudis apice bifoliis, fol. lanceolato-oblongis coriaceis acutis repandis. Racemo terminalo folia excedento, pluriflora. Bracteis distinctis infimis vacuis arctis, floriferis deciduis, floribus nutantibus. Labelli lobis lateralibus ciliatis, intermedio barbato ciliato, cristis 3-pectinato, ciliatis intermedio breviore.

Per. vix explanatum. Sepala æqualia oblonga acutiuscula. Pet. linearia, angustissima ratione sepalorum, patente reflexa.

Labellum cucullatum columna fere involvens lobis lateralibus oblongis ciliatis terminatis longe ciliata, ciliis albis basi fuscis, cristæ 3, e ciliis erectis fuscis reliatam dispositit, media infra apicem lobi, vel prope ejus basin subevanida ; lateralibus ad apicem continuis, conniventibusque. Columna parva curvata, clavata semiteres, apicem versus late marginata subalata. Anthera semi-inclusa. Rostellum vix declinatum acutiusculum. Stigmatis margines inferne glandulosæ. Pollenia 4, per pa-

ria incumbentia ope materia pulverea copiosa cohœrentia oblonga obtusa.

HAB. *Churra Punjee: Oct.* 14*th* 1835. *Assam Herb.* 139. Obs. C. fimbriata Lind. Orchid. 42 affinit.

2. *Cœlogyne maculata* Lindl. *Orch.* 43.

Planta minima elegans. Pseudobulbi basibus foliorum vestigiis vestito cylindracei, medium versus constricto quasi annulato, apicibus truncatis medio conici. Pedunculi uniflori basilares filiformes, uncialis vel 1½, bracteis inflatis carnosis laxis vestitis, floribus maximis bractea spathacea suffultis convoluta superne ventricosâ ovarium longitudine. Perianthium explanatum. Sepala, lineari-oblonga acuta, æqualia. Pet. conformia sed angustiora et paulo breviora, (album.) Labellum cucullatum obsolete 3-lobum, lobo terminal. subporrecto, crispato, cristis parum elevatis, papillis capitalis magnis seriatim dispositis insignitis, album, lobo lateralis coccineo lineato, terminali guttatum cristisque luteis. Columna parum curvata semiteres marginata, coccineo antice striata clinandrium marginatum, margine denticulata. Anthera seminclusa, mobilis dento posticæ inclusæ clinandrii affixa. Rostellum latissimum obliquum, infra viscosum stigma vel ejus margines incrassatum.

Anthera membranacea bilocularis, loculis obsoleto-bilocellatis? Pollia 4, per paria ope materia pulverea copiosa, cohærentia, oblonga valde complanata, accumbentia, potius oblique incumbentia. *Churra: October* 14*th,* 1835. *Assam Herb.* 138.

3. *Cœlogyne fimbriata?* Lind. Pl. CCXCI. Fig. I.

Rhizomata repantis, subarcuatis, bulborum subcylindraceorum basibus squamis, lanceolatis, membranaceis, arctis, vestitis. Foliis 2 subsessilibus lanceolatis acutis, repandis, submembranaceis, floribus binis in pedunculo unciali posito, maximis, pedicellis albis, ovario concolore paullo. longioribus.

Sepal. oblonga subpatentia acuta, venosa. Petalisque

linearibus angustissimis longitudine æqualibus ochroleucis *cream coloured* (lateral. sepalis) basi subsaccatis.

Labellum, cucullatum basi saccatum, 3-lobum, lobis lateralibus rotundato oblongis ciliatis brunneo-venulosis, terminali oblongo subtruncatis, fimbriato (fimbriæ atro-brunneæ) fusco-venoso cristis binis atro-brunneis elevatis, crispatis (*colore extus evidente*) basi labelli atro-brunneo.

Columna semiteres clavata, apice alato et utrinque marginata. Anth. terminalis apice callo carnoso, bilocularis.

Pollinia 4, accumbento-incumbentia oblonga complanata, ope materia pulverea copiosa cohærentia, glandulam planam cordatam mentient. Rostellum luteum carnosum, acutum. *Churra : Oct.* 17*th*, 1835. *Assam Herb.* 148.

Proxima, C. fimbriato Lind. columna apice dentato aurantiaceo.

5. *Cælogyne caulescens.* Griff.

Terrestris, 3-4 pedales. Foliis vaginis completis uncialibus striatis, limbus bifariis oblongo-linearibus concavis ascendentis emarginatis, coriaceis.

Spica terminalis hinc illinc vaginis viridibus apice bifidis prædita, apice florifera, rachis flexuosis, quasi articulatis brevibus compressis, faciem in sectihnis planiusculum vel subexcavatum.

Bracteæ squamiformæ amplexiusculæ minutæ carinatæ, subflorem quemque.

Flores numero-pauci, uno tantum evoluti, majusculi, albicernui nutantisve, cito marcescente.

Perianth. connivens, sepalis oblongo-linearis acuminatis, concavis 1½ uncialis subæqualis. Petalis eadem longitud. paullo latioris, majusque lanceolatis. Labellum membranaceum, cellulosum, (much thinner texture than the perianth cucullate over the column,) 3-lobum, lobis ovatis acutis, centrale duplo majore, fundo verrucoso-rugoso.

Columna elongata arcuata marginibus involutis dorso carinulata. Clinandii margines lateralis albi producti, postice emaginati *basi obliqui*, rostellum simplicem truncatum.

Anthera (sub horse shoe shaped,) convexa antice biloba poste decurvatum in processum insertionis bilocularis. Pollinia ? oblongo-ovata 2 vel 4 per paria collateralia interior minima lamelliformia.

Hab. *Malayensis,* In locis paludosis. Pulo Bisar ad littora maris.

The flowers should be examined immediately they are gathered as all are very marcescent.

It has great similarity in habit (especially in the rather peculiar axis of inflorescence) with the Sarchocheilus from Ayer Punnus.

Bolbophyllum.

1. *Bolbophyllum trisetosum.* Griff. Pl. CCXCIII.

Rhizomatis ramosis repentis, parce radicantis, undique squamis vaginantibus imbricatis nervosis tecta. Pseudobulbi (vix pisi magnit.) hinc illinc ex axilla squamæ vaginantis erumpentis ½ exsertæ. Folium unicum ovato-oblongum emarginatum carnosum, subconcavum leviter arcuatum.

Flowers at first as if scattered over various parts of the stem and sessile, in axilles vaginarum binæ, raro solitariæ, singulus in pedicello bracteis laxis albis membranac. omnino tecte vaginæ longitudini, minute initio albidi demum caudis aureo luteis.

Bractea summa subcucullata carina vaginans, ovarium omnino includens sepalo 3 tio, opposita!

Perianthium connivente erectum, cellulosum membranaceum. Sepalis in caudas convoluto acuminatas suberectis, cauda tertia breviora, laterali basi obliquis cum pede columnæ acutis.

Petalia oblonga multo minora. Labellum tremulum articulatum cum pede columni arcuato-linguiforme, luteum, submedio concavum.

Columna nana, dente postice elongato in setam anticis (ordinary,) pede lutescente. Anth. bilocularis.

Pollinia 4 per paria connata, interior minima accumbentia.
Ovarium non tortum.

Capsula oblonga, angulis inconspicua.

Hab. Common on trees about Malacca. This species seems to combine Bolbophyllum and Cirrhopetalum, which at most are sub generic forms of the same genus.

Yet though this plant is in all respects a Bolbophyllum, or Cirrhopetalum, its habit is very peculiar, the Rhizomata rarely rooting in the usual places, viz. under the pseudo-bulb. In most of the flowers break out in places with no leaves, and it has bracteate 1-flowered pedicels.

When flowers are developed from the same sheath as the bulbs, appearances are more ordinary, it must then be considered that it produces one or two scapes, each of which is one flowered. Odore suberoceo, but slight.

In the drawing the tails of the sepals are not represented as sufficiently spreading. The base of the pedicels are surrounded each with smallish sub-chaffy bracts.

1. Plant natural size.
2. Portion of a flowering branch.
3. Flowers seen laterally.
4. One lateral sepal the anticous do. and one petal removed, the anthers displaced.
5. Labellum in front.
6. Column seen laterally, anth. removed.
7. Do. front.
8. Under vertical view of anther.
9. Pollinia.

2. *Bolbophyllum Khasyanum.* Griff.

Rhizomata repentis filiformibus, crassiusculis, quamis vestitis. Pseudobulbis obsoletis, vix evidentibus.

Foliis singulis solitariis longiusculi petiolatis, petiola supra canaliculato, infra terete, læve, oblongo-lanceolatis apice obtusis et obsoleto-obliquis integris, 1-veniis coriaceis, valde carnosis, in petioli attenuatis. Scapis radicalibus folia paulo

ex cedentibus hinc illinc bracteatis basi squamatis, rubro-purpureis.

Floribus in apice scapi dense in spicam subcylindraceam congestis : bracteis subcarnosis ovatis concavis, ovarii longitudine.

Alabrasta postica, conico-pyramidalia. Sepalis lateralibus in super margines postici involute, or bent over : sepalo postico a basi cordatâ latâ acuminata, lateralibus obliquis cum pede columnæ et inter se coalitis duplo minore, colore herbaceo, lateralibus oblongis acutiusculo-carnosis sub 3-nerviis herbaceis papillosis, venis purpureis.

Pet. oblongis, denticulatis albidis nanis, 1-veniis.

Columna cum pede minima calceolari-forma, antice omnibus subpetaloideis 3-dentata, dentibus subulatis. Stigmatis vel potius calceoli cavitatis margines rubri. Anthera immatura pollinei vix. tegeis, sub-hippocreteriform facie incumbent., postice convexa emarginata.

Pollinia 4, collaterata per paria interiora minora.

Labellum cum pede columnæ articulatum comosum intigerrimum papulosum, papulis cellulosis plumeis sanguineis ideoque sanguineo punctat. sublinguæforme supra planiusculum basi concava.

Hab. Surureem in the Khasyah hills. *Assam Herb.* 180.

3. *Bolbophyllum hirtum.* Lind.

Rhizomata filiformia repent. Pseudobulba clavata apice alternatim bifoliü, lævis.

Folia oblongo-lanceolata obtusiuscula carnosa 1-nervia, terminalis directio eadem ut inferioris ! Scapus radicalis, foliis oppositus filiformis basi squamatus hinc illinc squamatus. squamis arctis vaginantibus ascendens parte florifera pubescens. Spica cylindrica densiflora basin paulo supra recurva, scapaque foliorum circiter longitudine, flores, subspicati albidi dense pubescentes, postici odore grato Anthoxanthi. Bracteæ membranaceæ, albidæ ovariorum longitudine glabratæ.

Per. connivens; sepala concava sublanceolata acuminata

dorso pubescentia, lateralia oblique paullo longiore cum pede columnæ et inter se connatæ gibberum formantia.

Pet. nana glabrata membranacea, fimbriata.

Labellum cum pede culumnæ elastice articulatum oblongo-linearum, ipsum arcuatum intigerrimum viridescens obtusissimum, quasi truncatum, ciliatum præsertim medium versus. Columne pede duplo triplove brevior, lata connubus subulatis viridescentibus, anthera parum excedent, utrinque interne denticulo acutis an semper.

Anthera, lutescens pulchre papillosa.

Pollinia 4, per paria collateralia, interiore minima, et vix, evident.

Pes columnæ apice viridescenti.

HAB. Khasyah hills. In arboribus epiphytica inter *Nunklow* et *Nowagoung : Nov.* 18*th*, 1835. *Assam Herb.* 263.

OBS. Verisimiliter idem B. hirto Lindley's Orchideæ, p. 51, et certo affinis B. auricomo, cujus odor idem.

4. *Bulbophyllum megalanthum.* Griff. Pl. CCXCII.

Rhizom. repent. vaginis reliquis striat. ad articul. radicant.

Pseudobulbis distantis parvis interdum fere obsoletis unifoliis. Fol. crassis præ coriaceis oblongís, emaginatis vel bifide marginibus recurvis petiole canaliculato ¼ torto.

Flos solitariis (*peduncle rises from the vagina next the Pseudobulb.* basi squamis vaginantibus imbricatis, cæterum subelevato nudo, folio breviore,) amplissimus posticus, fuscescens pallide, purpureo maculato, punctatumque.

Per. carnosum connivens. Sepala linearia, *postico* 2½ inches long, acuminato, longiore paullo; lateralia, basi oblique, concavo gibbosa in gibbum magnum bilobum sulcatum compede columnæ connata, lamina cæterum intus falciforme, horizontalibus marginibus versus apicem subincurvis. Petala minus carnosa, angustiore, paullo breviora, conduplicato-concava, valde acuminata.

Labellum cum pede columnæ tremul. articulat. basi carnosa : (sub-wedge-shaped,) 3-lobed, lobis lateralibus dentifor-

mibus centrale longissimo ratione lateral. angustissimo, marginibus *deflexo* (*upward rather*) recurvis fuscescente-brunneum purpureo-punctat. Columna elongata semiteres marginata apice 3-dentata. Stigma occupying $\frac{1}{2}$ its anterior face, rostello suberecto obscure plicato, integerrimo, pede productissimo, and so curved as to be almost level with the top of the anther.

Anth. subcristata papillosa, bilocularis margine anteriore little produced and incurved. Pollinia 4 per paria collateralia interiore solito multo majora. Ovar. pedicellus non tort. Fructus magnus, clavatus costis robustissim 2 inches long, with the remains of the perianth at the apex.

Hab. Malacca on trees and rocks at Pulo Bissar, where It is abundant, and one of the largest flowered species. I have seen only one perfect specimen in fruit.

Obs. Blume's characters as given in Lindley's Orchideæ if correctly quoted are quite useless.

There is very little difference between this Genus and Dendrobium.

B. megalanthium. Pseudobulbis distant. fol. solitariis oblongis æqualiter bifidis vel emarginatis, pedunculo e rhizomata, (from the sheath next the Pseudobulb,) basi imbricato bracteato folios breviore. Flore postico (maximo horizontale.) Sepalis oblongo linearibus, lateralia cum pede columnæ, in gibberum bilobo-connatis; petalis angustioribus, incurvato-concavis. Labelli sessilis lobis lateralibus erectis dentiformis, terminale angustissimo longissimo. Polliniis subæqualibus.

5. *Bolbophyllum Lindleyanum.* Griff.

Rhizomat. repent. Pseudobulbis obturbinatis glaucescentis glabris subnudisque, 1-foliosis, fol. oblongo lanceolato mucronato acuto, subintegro 1-venis, carnosa margine revoluta, scapa radicali solitaria gracili filiformia.

Folia longe superante hinc undique squama, vaginanato acuto stipato, apicem versus atro-purpurascens pilisque cellulosis cylindricis atro-purpureis hispida.

Racemo terminale nutanto? planta arborib. pendula. Brac-

teis lanceolatis apicibus longe aristatis, pedicellis ovariisque brevioribus viridescent. punctis minutis sanguineis. Pedicellis ovariisuqe pilis albis cylindricis densæ tectis floribus elegantissimis : subodoratis.

Per. explanatum. Sepalis ovatis acutis extus pilis ut autea tectis intus villosisimis, pilis longioribus albis, albidis,3-nervus, nervis apicibusque recurvis atro-bruneis. Marginibus revolutis, lateral. obliquis, inter se et cum pede columnæ elongato in gibberem connatis. Pet. ovata minima,nervo unico medio viridi, intus glabra extus ad apices pilis albis longis villosis ciliatisque.

Labellum *tremulum* cum pede columnæ articulatum lanceolatum carnosum, pilis albis ciliatum albidum marginibus viridescent.

Columnæ nana semiteres basi producta deorsum curvata, apice productionis viride, apicem versus leviter 2-alatum, 3-dentatum 3-4 denticulatum, denticulo medio setiformia denti postice minori; anther affigente laterale filiformibus, subcapitatis capitulo papilluloso ambabus postice ad basin 1-denticulatis, Anthera papilloso hispida cristata : obsolete 4-locularis. Pollina 4, aurea interiorib. minimis. Rostellum *deflexum* ?

Species elegantissimi.

HAB.—Mergue in arbor, ad littora Mergue Herb. 697. Nov. 1834.

6. *Bolbophyllum auricomum.* Lind.

Pseudobulbis ovatis glaucescentibus. fol.?

Racemis, pseudo-radicalibus 6-8 uncialibus nutantibus teretibus, floriferis sulcatis angulatisque interdum rachiformibus, floribus dense racemosis, albis, majusculis, odore Anthoxanthero suavissimo. Labillo aureo postico.

Per. *connivens.* Sepala lineari-lanceolata acuminata membrancea, *antico* paulo minore, lateralia oblique inter se et cum pede columnæ in gibberem connat. Pet. multo minora membranacea fimbriata. Labellum cum pede columnæ articulatum oblongum integerrimum carnosum papillosum tremulum obtusum curvatum. Columna nana pede paulo brevior antice obsolito-dentata

dente postice intermedia crassa subulata. Anth. bilocul. terminal. subcristat. Pollinia 4, interiora minima lobuliformia.

HAB. In arboribus Mergue. *Merg. Herb.* 839.

7. *Bolbophyllum imbricatum* Gr.

Spica cylindrica densiflora basin ½ unciam, infra bracteam spathacea fusco-purpurascente convolute suffulto colore scapi.

Bracteæ propriæ lanceolato-ovatæ acuminatæ carinatæ fusco-purpuriæ, ovarium æquantes vel excedentes.

Flores dense conferti aspectu valde singulares chocolate purple, aspectu velutina. Labellum olivaceo-viride posticum.

Sepala postica nana, later. carneo-albida, marginibus venisque 3, purpuresis. Lateralia difformi multo majore compressa, marginibus in ternis approximatis sed liberis basin excepta subtus concava: supra præsertim extrorsum pubescentia, 3-venosa purpurea. Petala nana oblonga acutiuscula albida cellulosa.

Labellum carnosum integerimum, cordato-ovatum, obtusum basi medium sulcatum papulosum, quasi velutinum cum pede columnæ elasticum articulatum viride fusco guttatum tinctumque, pes purpureo-tinctus. Columna nana, pede cui sepala later. adnata, apice tantum libero brevior antica convexo-gibbosa, cornua lanceolata acuminata, anthera superantia.

Anth. bilocularis *membranacea*.

Pollinia 4, per paria collateralia, interiora minora.

HAB. Khasyah Hills and Assam. Cæspitosa dense, in rupibus.

Myrung in the *Khasyah hills*, Assam Herb. 138, 234, 12*th*, *Nov.* 1835, in sylvosis B. imbricatum *nobis*, character omnino B. cylindracei.

8. *Bolbophyllum reptans* Lindl.

Rhizomate repentis in rupibus, filiformibus, junioribus vaginis laxiusculis oblique truncatis vestitis, senioribus nudiusculis. Pseudobulbi obpyriformi læves, foliorum vestigiis subvestita.

Fol. unicum lineare basiu in petiolum brevem attenuatum apice emarginatum, coriaceum 1 venium, subtus subcarinatum.

Racemi radicales foliis breviores fuscescente brunnea. Bracteis 2-3 vaginantibus albis donato. Bracteæ florum oblongæ membranaceæ pallide fuscescentes, pedicellis paullo excedentis. Flores numerosiusculi secunda resupinata (antice) ochroleuci.

Per. connivens. Sepala lanceolata acutiuscula pervenia, venis purpureo-sanguineis, in lateralibus basi tantum conspicuis, lateralib. basi obliquis inter se et *cum basi pedis* elongato columnæ in gibberem coalit. Pet. oblonga nana acutiuscula 1-venia pallidiora, secus medium maculis sanguineis guttata.

Labellum cum pede columnæ articulatum linguiforme, cordato-ovatum integerrimum carnosum marginibus baseos ad medium cristam clavatam mentientibus ob-latera lingui utrinque breviter producta, ochroleucum, sanguineo-tinctum.

Columna ratione pedis sursum arcuata convexa, stigma infra gibbosa apice dilatato ramissima semiteres, apice hinc utrinque antice in corona subulata ascendens. Anth. terminalis e cristata simplex. Pollinia 4 per paria collateralia interiora minora minima, pallide lutescent.

Hab. Khasyah hills. In rupibus arenosis. *Bogapanee: November, 3d,* 1835. *Assam Herb.* 189.

Obs. Ex charactere accedem videtur B. reptants Lindl. notu dignum of flores resupinatos. Petala Sepalisque varis spiralibus numerosissimis donato e cellulis spiralibus numerosissimis ortis. Flores densi aureo aurantiacei Racemus interdum duplex.

9. *Bolbophyllum cirrhopetaloides*. Gr.

Rhizomata filiformia squamis erectis, scariosis parum distinctis vestita. Pseudobulbi pyriformia, basi concava squamarumve inferne subindurata.

Folium unicum lanceolatum acuminatum, apice æqualiter

emarginatum basi (petiolo brevi semitorto) coriacae, 1-venia. Spica radicalis, pseudo-terminalis, apice densiflora. Scapo gracillimo filiforme parte florifera incrassata, hinc illinc bracteis scariosis, laxis vaginantibus donata, pendulo a medio, flores densissimi in quasi capituli ovato-conicum digesto, deorsum curvato, respectu terræ, sursum respectu axeos scapi ideoque respectu axeos postici. Bractea lanceolata membranacea ovario duplo brevior, respectu terræ reflexa. Flores lutescentes purpureo-saturate tincti maculatique, aspectu sui generis, insectorum quorumdam formam referentis.

Per. connivens. Sepala difformia, postico quoad terram lanceolata tri-carinata, carinâ media alatâ,aspectu laterali 3-angulari. Lateralia (multo) 3-plo 4-plo longiora, bi-carinata carina nempe vaginæ inferioris (quoad terram) obsoleta. leviter adnata, acuminata apicibus, extrorsum curvatis subflexuosis, potius valde complanata, pagina superiora marginem versus 1-carinata, marginaque ipso e carina alæforme oriente, inferiori plano. Cavitatem adhesione mutua calceolæ referentem formantia.

Pet. 2 carnosa triangulari-subulata! leviter incurvata (respectu axeos,) intus convexa, viridescente lutea, extus sanguineo picta.

Labellum sessile in pedis columnæ apicem articulatum mobilissimum cordato-linguiforme ovatum carnosum supra bicristatum, cristis clavatis pulcherrimum venuloso-rugosis atropurpureis bases versus crenato-denticulata glabra, limbo cæterum marginibusque subincurvis respectu axeos dense albo villosis, albis subtus respectu axis labelli, albumen medio valde convexo incrassatum.

Columna cum pede arcuato-semicircula quasi format. basi externe prope petalorum situm, processus petaloides subconniventes obovato-spathulatos albidos sanguineo-maculatos gerens; an vere columnæ partis cæterum parte ascendente respectu axeos, nana semiteres apicem versus utrinque in

processum subulatum leviter arcuatum product., lutescens maculis rubris minimis paucisque.

Per. arcuatus ad basin cristam conicum compressum gerit. atro-purpureus, apice subdilatatus. Rostellum truncatum carnosum. Anthera terminalis apice oblonga obtuseque rostratus, rostro ascendente, papulosa semi-immersa, bilocularis, septo incompleto. Columna dorso 3-dentata dente postica antheram affigente minore, 2 lateralia cum processibus subulatis confluentia majora mutuo conniventia (denticulis interjectis aliquando). Pollinia 4, collateralia cerea, materia pulverea nulla interiora minora semi-ovata.

Hab. Khasyah hills, *Churra: 25th, Oct.* 1835. Assam Herb. 169.

Obs. Species pulchra notatu dignissima, et inter Cirrhopetalia Bolbophyllumque intermedia: corpora subulata, (in descriptione petala) obsitu, nec petala sed forsan bractiæ sunt, an potius appendices costarum lateralium ovarii, sepalis alternantium. Pet. vera descripta sunt ut processus columnæ.

10. ***Bolbophyllum suave.*** Gr.

Rhizomate repente, pseudobulbis obclavatis, unifoliis, folio spathulato-lanceolato obtuso integro, scapo glabro, spica nutante-pendula villoso-pubescente, sepalis villosis acuminatissimis petalis ovatis, fimbriatis, labello lingulato apice bifido secus margines villoso-ciliato.

Pseudobulbs obclavate bearing each a single spathulate, lanceolate entire obtuse leaf. Raceme arising from the base of Psendobulb, nearly a foot long, furnished here and there with a sheathing inconspicuous bracte: bearing flowers throughout its upper third, in which it is covered with glandular pubescence. Bracts ovate cordate concave membranous. Pedicels (and ovaria) of the flowers shorter than the bracts.

Flowers small white inconspicuous, and together with the whole plant exhaling during drying a delightful scent of new mown hay. Perianth covered with cellular pubescence. Sepals cirrhosely acuminate subcarinate along the centre, the

lateral oblique one united to the foot of the column. Petals minute, broadly ovate with fimbriate margins otherwise smooth.

Labellum tremulously articulate quite concealed tongue-shaped, fleshy, yellowish disc provided with cellular papillæ or hairs: its anther resembles that of the letter C. Column short, white with a long very narrow foot, which, towards its end is distinct from the sepals and erect, to the apex of this the labellum is articulated, lateral processes of column shortly cirrhose or setose, subulate apices incurved, the terminal being nearly twice as short.

Stigma large occupying nearly the whole of the face of the column, bounded superiorly by the oblique floor of the clinandrium, anther membranous.

Ovarium short densely covered with the same cellular pappilliform hairs.

Hab. Dargeeling received from Dr. Campbell.

Obs. This species is nearly allied to *B. auricomum,* (so far as characters go, it appears to be distinguished by the smooth scape, and the bifid labellum,) and more nearly to *B. hirtum.* It also agrees tolerably well with Blume's description of his *Diphyses odorata.*

The great acumination of the sepals also accurs in a Malacca species, with quite a different habit.

The scurf on the Pseudo-bulb is lined internally by a layer of spiral cells placed in an opposite direction to the cells of the scurf itself.

11. *Bolbophyllum grandiflorum,* Gr. Pl. CCXCIV. Fig. 1. *Itinerary Notes,* p. 146. Bootan Herb. 705.

12. *Bolbophyllum repens* Gr. Pl. CCXCIV. Fig. II. *Itinerary Notes,* p. 66. Khasyah Herb. 1021.

13. *Bulbophyllum uniflorum* Gr. Pl. CCXCV. *Itinerary Notes,* p. 110. Bootan Herb. 138.

14. *Bolbophyllum* sp. Pl. CCXCVI. Fig. I. *Itinerary Notes*, p. 41. Khasyah Herb. 664.

15. *Bolbophylli* sp. Pl. CCXCVI. Fig. II. *Itinerary Notes*, p. 66 Khasyah Herb. 1024.

16. *Bolbophylli* sp. Pl. CCXCVII. *Itinerary Notes*, p. 104. Bootan Herb. 65.

CIRRHOPETALUM.

1. *Cirrhopetalum vaginatum* Lindl. Pl. CCXCVIII. Orch. sp. 59.

Rhizomate radicante.

Pseudo-bulbi parvi obclavati 1-foliosum.

Fol. infra in petiolum involuto-convoluta lineari-oblonga apice recurva emarginato-coriacea, leviter arcuata deorsum, margine subrevoluta.

Scapus fol. subæquans, 4-uncialis, bracteas 3-4 inflatas (laxas) membranaceas amplexicaulibus gerens, apice subumbellate florigero.

Rachis florigere brevissimis subconicis recurvis. Bracteæ punctulatæ lineari-acuminatæ pedicellis ovarii paullo superans.

Flores ob curvati axeos secundi, plus minus deorsum spectantum, *non resupinatum* stramineam vel pallide ochroleucum inodori circiter 10. Per. ringens membrano-cellulosum. Sepala postico fornicato acuto, lateralibus basi oblique convoluto-acuminatissimis tunc caudatis, cauda solida plus minus pendente scapo ⅓ brevior.

Labellum tremulum cum pede arcuato columnum articulatum subcordatum recurvum carnosum, cristis 2, intro-marginalibus, luteum. Columna antice bisetaceo pallida anthera bilocularia like a hunting cap. Pollinia non visa. Only two flowers or a scape examined.

Petala orbiculari-ovato fimbriato-denticulata uti sepala, caudis exceptis. Clinand. profunde margo anticus subinteger postico dente subulato anthera affigent.

1. Plant about natural size.
2. Flower laterally magnified.
3. Same, upper sepal, and one lateral sepal entirely removed.
4. Front view of column and anther.
5. Do. anther removed.
6. Front view of Labellum.
7. Vertical view of under face of anther.

HAB. Not uncommon on trees, at Malacca.

2. *Cirrhopetali* sp.

Rhizomate repente. Pseudo-bulbis obturbinatis lævibus subnudis fuscis, folium unicum lineari-coriaceum curvatulum apicem æqualiter emarginatum. Spicis radicalibus folia subæquantibus nutantibus flexuosis filiformibus, bracteis, subpersistentibus, albido, viridescentibus, masculis brunneis floriferis ovaria duplo excedentibus. Sepala membranacea lineari lanceolata acuta subfalcata albida, venis 3 purpureis distinctioribus in postico vel potius antico quoniam flores resupinato, 2 lateralibus connatis in uno apice bifida. Pet. ovata, latiora sed brevissima basin centro macula purpurea.

Labellum apice callosum, callo clavato albido, lobis lateralibus auriculæformis. Pollinia 4, per paria collateralia. Caudiculæ spathulatæ 2, distinctissimæ apice subdilatatæ in glandula oblonga obtusa, consistentia parum diversa. Glandiculæ in rostellis applicitæ liberatæ cito convolutæ, aqueæ immersi cito a polliniis separabiles. Pollinia sessilia.

Column simplex nana semiteres. Anth. terminalis loculis membranaceis, discretis, dentius persistens. Pollinia cerea collateralia lutea externe cujusque paris, minus quoad angulata, 4 perparia collateralia sed discreta. Clinandr. obsolet. at margo stigmatis cuique loculo opposit. in processum subulat. rostellis formam productus est.

HAB. Khasyah Hills. In sylvis, epiphitica, Surureem Nov. 2, 1835. *Assam Herb.* 183.

Planta suigeneris, facie Cirrhopetala.

3. *Cirrhopetalum gamosepalum.*

Rhizomate repente filiformibus pseudo-bulbis sæpius 4-angulatis, 1-foliosis, folio subsessile oblongo lanceolato emarginato integerrimo, coriaceo. Scapis erectis solitariis pseudo-radicalibus filiformibus tenuibus, basi bracteatis, ad medium ? 2 bracteatis, supra nudis, floribus subumbellatis, bracteolæ setaceæ ad basin cujusque.

Per. explanatum. Sep. maxissime inæqualibus postico quoad lateralia minimo, lanceolato apice in setam desinente, ciliat. atro-sanguin. basin versus viridiscens: laterato longissime valde oblique et qnasi torta basin versus acuto inter se marginibus cohærentio, punctis purpureis crebris, sæpe confertis: nec torto sed margo utriusque interior, recurva. Pet. sepallo postico conformia sed minora, ejusdem coloris. Labellum cum pede columnæ sursum curvato. articulatum valde mobilum, integrum carnosum sub-lanceolatum acuminatum curvatum deorsum, basin versus lineis 3, elevatis atro-purpureum marginibus saturatius, apicem versus luteum. Columna nana, semiteres, apice 3-dentata dente postica minima obtusa, lateralia in auriculas expansas, albida, maculis atro-sanguineis, pede columna superante atro-sanguineum, apice pallida dilatata. Stigma subquadrata parva. Anthera ?

Hab. Epiphytica in arboribus Mergue. *Mergue Herb.* 520. Proximum Bolbophyllum radiatum. Lind.

4. *Cirrhopetalum bootanensis,* Pl. CCXCIX.

1. Flower viewed laterally.
2. Do. much enlarged, one petal and one lateral sepal removed.
3. Front and vertical view.
4. Labellum seen in front.
5. Do. lateral.
7. Anther viewed interiorly.
8. Pollinia as seen in situ, from above.
9. Do. spread out shewing that they are connected below.

10. Large mass viewed interiorly.
10*a*. Ditto exteriorly. The female does not always exist.

ERIA.

1. *Eria affinis.* Gr.

Pseudo-bulbis subclavatis elongatis rugosis vestigiis foliorum parce vestitis, apice 3 foliosis. Foliis lanceolatis coriaceis oblique emarginatis subeveniis. Racemis lateralibus erectis, foliis brevior basin paliaceis. Bracteis membranaceis magnis lutescentibus fusco-pallidis tinctis, pedicellis ovariisque brevior. Pedicellis ovariis sepalisque extus parcissime pubescentibus brun-neo-stipatis; floribus albis, labellum basin pallidissime aurantiaceo-tinctis, 3-lobis, lobo medio rugoso, subcordato, 3-cristato, cristis lateralibus medio multo magis prominulis aurantiaceo-pallidissime tincto. Columnæ pedis basin rubescent.

HAB. Mergue ad littoram: *March*, 1835. Mergue Herb. 1074.
OBS. Affin. Eriæ pulchellæ No. 1055 et forsan varietas.

2. *Eria pulchella.* Gr.

Pseudo-bulbis ovatis rugosis, apicibus 2-3 foliosis, fol. anguste-lanceolatis, oblique emarginatis coriacea. Racemis erectis e dorso basim vagin. erumpent. erectis basi squamis stipatis, foliis brevioribus ochroleucis, parce pubescentibus. Pubescentia appressa, atro-purpurea. Bracteis maximis oblongis, ochroleucis, marginibus revolutis, pedicellos ovarique subæquantibus. Pedicelli sepalorumque bases ovariaque eodem more pubescente-ochroleuci. Sepal. ochroleuca pallida. Per. concolorum. Labell. 3-lobum, lobo lateral. purpuraseent. medio majora rugoso lutescent, cristæ 3, purpurascentæ, lineares quarum laterales basin lobi medio nec attingent. medium insuper cum producto ibidemque luteo. Columna albida pedis basis fusca. Anth. biloculares terminales loculis 4 locelat. Pollinia 8-quaternat. materia pulverea cohærentia. Clinand. profundiuscul. columnæ dens postice brevis. Rostellum obtusum. Pollinia late obovata.

Hab. Epiphyt. in arborib. Mergue: *Feb.* 1835. *Merg. Herb.* 1055.

Odor florem subamylaceus, ingratis.

3. *Eria teretifolia*, Gr. Pl. CCC. Fig. II.

Rhizoma repens, radices longas ramosus emittens.

Pseudo-bulbi uniseriati approximati ovato-rotundati novelli apici 1-squamati vel vaginati unifoliosi dense pubescentes seniores glabri nudique. Fol. clavato-cylindracea vel subcylindrica 2 uncialia obtusa.

Scapo racemoso, paucifloro, ex axillam squamæ vaginantis, folio breviore 2-3 floro, subflorem quemque bracteate dense pubescente. Flores inconspicui ferrugineo-albidi subnutantes.

Per. connivente ringens; sepalis carinatis, lateralibus majoribus basi valde obliquis extus dense pubescente intus parce puberula.

Pet. lineari-lanceolata glabra apice subreflexa.

Labellum cum pedem columnæ longe producto elastice articulat. explanatum oblongo-lanceolatum 2-3-ties undulatum curvatum apicem et basin conduplicatum.

Columna nana pede elongato plano fere 3 ties breviore, dorso pubescens. Stigma maxima occupying the whole of its inner face, basi bituberculata centro carinatum.

Anth. acuminata bilocularis, loculis fere verticalibus. Pollinia 8-quaternatim incumbentia, materia pulverea copiosa.

Rostellum simplex convexiusculum. Ovarium uti pedicellus dense pubescens.

Hab. In Monte Ophir edito, ad Paddam Bhatoo. In rupibus, inter Nepenthes.

Obs. Clinandrium acuminatum in dente postico obtuso, lateribus explanata.

The outer layer of cells of the leaves are transverse, or at right angles with the rest.

I see nothing like it in Lindley's Orchideæ. The two lower stigmata indicated by the tubercles have not occurred to me before in this genus, nor the dorsal carina. As other species

have round leaves, a name more specific may perhaps be hereafter selected.

1. Plant natural size.
2. Flower seen laterally.
3. Do. one lateral, and the posticous sepal removed.
4. Labellum rather spread out (in front.)
5. Columna and Anther front, *a* rostellum, *b* dorsal carina, 3-bi-tuberculate portion of stigma.
6. Anther back suboblique view.
7. Pollinia part.
8. Pollinia in situ. (not seen so perfectly.)
9. Columna most part of its foot removed, *a* attachment of anther, *b* rostellum, *c* dorsal carina, *d* tuberculate portion of stigma; is the stigmatic surface confined to this base; or spread up along the carina also, or all over the stigmatic surface; it agrees with the character (except habit) of Trichostasia, Bl.

4. *Eria cylindripoda* Gr.

Caulescens cæspitosa ob-rhizo matibus valde abbreviatis› surculis squamis carnosis viridi purpureo-maculatis tectis. Caulibus cylindraceis, subspathamæis basin squamas vaginisve. binis brunneis vestitis apice bifoliis, foliis lanceolatis petiolis arcte vaginantibus acutis apice obliquis carnosis luteo-viridibus 1-veniis, subplicatis.

Racemo terminale pendulo e squamis, quarum supera carinatis, carina viride, laxiuscula, flor 3-4 in partis florifera flexuoso, bracteis linearibus, ovario 3-plo brevioribus, floribus posticis sepala albida bases versus purpurascente, et sub 3-venia.

Pet. alba, labellum extus album, intus sanguineo-pulcherrime lineatum, saltem quoad lobos lateralis terminale eodem colore maculato, cristis luteis basin sanguineo-punctulatis, ut etiam lobi apex. Sepala oblongo-linearia obtusiuscula, lateralia basi oblique inter se et cum pede columnæ (angulum cum columne vix efformante) in gibberem connatum. postico rectiusculo, ut etiam petalaquæ lanceolata alba.

Labellum cucullatum 3-lobum, lobis lateralibus rotundatis, terminalibus oblongo recurvato acutiusculo integro, cum pedem columnæ articulato mobileque, cristæ 2, elevatæ, crispatæ ad basin lobum intermedium augustatæ et luteæ magisque undulatæ, 3 tio consimili centraliter, duabusque aliis lateralibus utrinque quarum extima valde incompleta superjectis, omnibus his exceptis, infra apicem lobi terminalis *paulo* subconiventibus.

Columna nana pedis longitudine anticum sanguineo-maculata, semiteres, apice pedis obtuse emarginato, posticum obsolete 3-dentata apicis denticulatis.

Anth. terminalis mobilis opercularis cucullata obconnectivum antice productum in formam rotundata, dente posticæ columnæ affixa bilocularis, loculis clinandro oblique semi immersis. Clinand. centro verticalibus. Stigma quadrata.

Pollinia 8, quaternate cohærentia et par paria collateralia materiæ pulverea copiosa, antica minora, valde complanata rotundata. Anthera bilocularis loculis obsoleto-4-loculatis.

HAB. *Khasyah Hills. Myrung : Nov. 9th,* 1135. Assam Herb. 231.

OBS. This species is intermediate between Eria and Phreatia.

5. ***Eria Lindleyana.*** Gr.

Rhizomata brevissimis ideoque caulibus e basibus aliorumortis videntur. Caulib. fusiformib. squamis vaginarum undique tectis apice 1-3 foliosi. Fol. lanceolata vel ovato-lanceolata integer rima glabra, venosa, apice recta vel torta. Racemis termina libus foliis breviorib. plurifloris. Bracteis obovatis membranaceis subcoloratis, floribus pro genere majusculis pallido-luteis labelli 3-lobi, lobis lateralibus rotundatis purpurscent. intermedio flavo. Sep. lateral. obliquis cum pede columne valde elongato et inter se in calcarum longum obtusum adnatum. Anth subcomplete 8-locularis. Pollinia 8-obovato cuneata albida, materia granulosa viscosa inter se cohœrentia. Columna nana 3-dentata dente postica subulata brevi lateralibus mem-

brana ceis rotundatis denticulatis. Rostellum explanatum lingu forme antica convoluta.

Hab. Epiphytica in arborib. ad littoram, Mergue. *Mergue Herb.* 554.

6. *Eria flava.* Lindl.

Pseudo-bulbis obovato-clavata, complanata sulcata, basin vaginæ reliquis vestita, 3-4 foliosi. Folia breviter petiolata, elongato-lanceolata, acuminata, mucronata, integerrima, carnosa, 1-venia, cæterum pluries introvenia.

Racemi ex axillas folii pseudo-bulbum infimi lapsi, spithamæi, foliis paullo breviores, bracteæ lanceolatæ fuscæ concavæ floresque densissima albo-lanata, lana epilis simplicibus sæpe flexuosis.

Perianthium ringens: Sepala lineari-lanceolata, extus dense lanata, intus glabrata, venosa, fusca brunnea intus lucida lateralia in calcarum incurvum cum pede columnæ connata.

Pet. linearia acuta glabra, sepalis duplo angustiora, venosa, margines evenii, fasciculi raphidum plurimi. Labellum subcucullatum, recurvatum, lanceolatum (marginibus membranaceis lutescente fuscis) cæterum fuscescens; obsoleto 3-lobum, lobis lateralibus rotundatis, terminali 3 cristata, cristis lateralibus latis oblongis parum elevatis, centrale medium supra prominente.

Columna semiteres, nana, pede curvato ipsam duplo superante, fuscescens, stigma apicale.

Clinandrium integrum, profundiusculum. Anth. hæmisphærica semi-immersa lutescente loculis obsoleto 4-locellatis. Rostellum deflexum integrum.

Pollinia cerea farinacea; late obovata, quaternatim cohærentia, caudiculis crassis in massam rotundatum medio sulcatam coalitis.

Hab. Epiphytica in arboribus, *Naga Hills*: *May*, 1836.

7. *Eria lanata.* Gr.

Pseudo-bulbis ovatis, sæpius 3 foliosis compressis. Fol. lanceolatis vel lineari-lanceolatis, eplicatis, acuminatis carnosis

1-nervus. Racemis pseudo-radicalibus basi squamatis (squamis imbricatis, membranaceis plus minus sphacelatis,) dense niveo-tomentosis. Bracteis lanceolatis subglabris, membranaceis pedicellos excedent. Labellum limbo interdum atro-purpureum, sphacelatis basin versus plus minus viridescenti-albid. Sepala petalaque apicibus recurvis. Pollinia 8, quaternatim cohærentia, compressa obovata.

HAB. Mergue. *Mergue Herb.* 810.

OBS. Sp. pulchre distinctissima, cui Eria flaviscens e Moulmein valde affinis. Capsulæ clavato-cylindricæ subteretes subglabræ.

8. *Eria biflora*. Gr.

Caulibus compressis bases versus attenuatis squamisque membranaceis laxis vestitis, apicis versus foliolis, fol. basibus vaginantibus dilatatis, lanceolato-linearibus, apicibus obliquis. Racemis pseudo-extra axillaribus 2-floris abbreviatis paucifloris, petiolis dilatatis vix longior, floribus inconspicuis. Bractea magna lanceolata ad basin cujusque pedicellum, que opposito sunt pedicelli ovariumque excedento. Per. connivens, venosum; sepalis lanceolato-linearibus postico, longiore lateralibus basi obliquis inter se et cum pedem columnæ in gibberem connatis. Pet. sepalis conformia angustiora. Labellum lanceolatum integrum membranaceum, basin versus subcucullatum repandum? cristis 2, clavatis linearibus a basin ad apicem fere current: in medio infra apicem connivent. Columna pede elongato brevior semiteres. Anth. terminalibus obsolete 8-locularibus, pollinia 8, obovata.

Capsulis breve pedicillatis ovatis 6-costatis, costis obtusis, pedicellis, pseudo-radicalibus basi squamatis.

HAB. Epiphytica in arboribus præsertim Peenma, cum præcedent: *December*, 1834. *Mergue Herb.* 830.

9. *Eria secundiflora*, Gr. Pl. CCCI.

Planta spithamæa epiphytice in arboribus. Rhizomate re-

pente. Caulis vel pseudo-bulbis digitatis vel paulo ultra cylindraceis crassitudine pinnæ anserinæ, striatæ, novelli basi squamis laxis membranaceis reticulatis vestito, seniores subnudi vel tantum basi *reticula* obsito, reticula e reliquis squamarum.

Squama truncata margine sublacera in apicem pseudobulbi.

Folia bina subsessila lanceolato-linearia, infra subglaucescentem apice acuta et oblique emarginata, colorem supra pallide viridia.

Racemus terminatis foliis brevior, albo pubescens in parte floriferaquæ complanata flexuosa, flexuris floriferis. Flores resupinati distichi arcto secundi basi bractei squamaformi concava suffulti inconspicui.

Pedicellus brevis ovarium sepalaque extus dense albo tomentosa.

Perianth. connivens, sepala subæqualia, lateralia paulo majora, concava suborbicularia subacuta intus glabrata lateralia suboblique pedem columnæ adnata et imis basibus inter se.

Petala ovata, alba subcarnosa margine purpurea. Columna cum pedem columnæ protracto continuum oblongo-quadrata concava, triloba, lobis lateralibus rotundatis parvis, medio subtruncato medio callifera, callo longitudinaliter sulcato alba. Columna nana clavata, pedem vix æquant. Clinandrium profundum margine obsoleto-3-dentato dentibus lateralibus antice carnoso-gibbosis, margo anticus integerri-mus. Anth. terminalis bilobis bilocularis-loculis 4-locellatis. Pollinia 8, quaternatim ope materia pulverea cohærentia albida, subobovata et subæqualia.

1. Plant natural size.
2. Flower.
3. Do. two sepals removed.
4. Petal Labellum and Column from a bud just before expansion.
5. Labellum and Column of the same.
6. Labellum front view of.

7. Column ditto.
8. Ditto anther removed. Pollinia displaced.
9. Column, male genitalia removed.
10. Column, back view of.
11. Anther. 12. Pollinia four in situ. Pollinia removed from one cell.

Hab. In Gordoniæ specie montibus Nagensibus alt. 3100 ped. *February*, 1837.

Obs. Eriæ proxima,discrepans tantum forme inflorescentiæ.

10. *Eriæ* sp. Pl. CCCI. *Itinerary Notes*, p. 83 Khasyah Herb. 1216.

Dendrobium.

1. *Dendrobii* Sp. Pl. CCCVI.

Caules clavati e basi parva bulbiformi, articulis clavatis vel subcylindraceis, denudatis læte luteis, si squamæ vel vaginæ reliquiæ ad sunt cinerea striataque. Radices albæ.

Bracteæ albæ membranaceæ.

Flores binati, postîce majuscule odore fragrante delicatissimo violæ instar.

Pediceili ovariis multoties longiores pallide lutescenti, ovarium *viridens.*

Sepala, alabastro viride tincta: ochroleuca oblonga calcare apice bilobo concolore.

Pet. oblongo-lanceolata repanda, sepalis majora pallidiora.

Labellum cucullatum integrum reflexum, extus ochroleucum, intus purpureum venoso-striatum, limbo pubescente, pubescentia densa purpurea apicibus albis. Columna alba, pede aureo medio carinato purpureo lineata. anthera alba.

Pollinia 4-per paria. Rostell. integrum.

Hab. Pendulum epiphyticum in Gordoníæ sp. Near Yoomsam in the Patkaye mountains between Assam and Burma, altitude 3500 feet: *Feb.* 27*th*, 1837.

2. *Dendrobium uniflorum*, Gr. Pl. CCCIII.

Caulis submoniliformibus, vaginis nempe basi apiceque subconstrictis, et abbreviatis, fol. limbo ½ amplexicaulibus, disticha oblongo-lanceolata, ascendente-recurva, coriacea apice inæqualiter bifida, limbo medium supra planiusculo.

Flores oppositifol. solitarii longe pedicellati, folia excendent. (pedicellis ascendentibus, basi bracteolat.) ringent, bilabiat. majusculi albi.

Sepala latiuscula ovata acute acuminata patente-reflexa, lateralia basi oblique cum pede columnæ in calcar spurium connat.

Pet. late-ovatis apiculatis, sepalo postico subsimil, sed brevior.

Labellum explanatum 3-lobum, lobis lateralibus spathulato-obovatis ascendentibus, central. magno late obcordato, medio costis carnosis 3-5, elevatis, initio horizontal. demum conduplicatis cum pede columnæ in calcar spurium; *fauce angusta bigibba*, connata.

Columna nana, pede longe, columna connata.

Clinand. profundum, 3-dentatum, dente postice subulato anth. affingens. Rostellum anticum bipartitum, lacinea supera laminiformi-involuta. Pollinia 4, per paria collateralia. Anth. cap-shaped papillosa bilocularis.

1. Plant half size.
2. Flower etc. seen laterally.
3. Do. front.
4. Do. one side of Perianth removed.
5. Labellum (underneath.)
6. Long section of flower.
7. Anth. seen laterally, *a front* or peak, *b pollinia* part of.
8. Anther under side surface.
9. Pollinia front.
10. Laterally.
13. Column in front, *a* terminal anther-fixing tooth, *b* upper laminiform part of rostellum, (place between it and *d*, to

the lower fleshy part is choked up by viscous matter, *e* stigma, *f* adhesion of labellum, *g* do. of lateral sepals, *h* orifice of spur.

14. Back view of Column.
11. Transverse section of the ovarium.
12. One carpellary leaf, and two placentas, shews that the placental costæ are not throughout distinct, but on the contrary, continuous with the barren costæ.

HAB. In arboribus Monte Ophir supra *Puddam Bhatto: February*.

OBS. This species appears to be allied to Blumes Onychium connatum.

It has not the genuine appearance of a Dendrobium.

D. uniflorum. Caulescens, fol. membranaceis coriaceis. distichis ascendent. patentibus apice obtuse bilobis, (vaginis submoniliformibus.) Floribus albis oppositifoliis solitariis, pedicellis basi imbricatis bracteatis, bracteis summis acuminato-angustis, labello 3-lobo, cum pede columna in calcar connat. lobo medio late obcordato, centro 3-cristato.

3. *Dendrobium amplum* Lind. *Orchid.* 74. Pl. CCCIV.

Rhizomat. repentib. pseudo-bulbisque ovatis demum angulatis squamis scariosis striatis vestitis.

Fol. alternantis breve petiolatis ovato-lanceolatis venosis, apice subæqualiter emarginatis bifidave plicatis, plicis sursum convexis nec angulatis.

Racemus terminalis ex axillam bracteæ scariosæ vaginant. peduncul. excedent. abortu 1-florus. Pedunculus lævis, subbibracteatus, bracteis membranaceis striatis, flore abortivo laterale minimo, terminalis (pseudo) ovario longissimo basi bractea consistentia eadem, multo breviore stipato, postice plano, antice convexiusculo.

Per. explanatum. Sepala $2\frac{1}{4}$ uncialia, lanceolato-oblonga, obtusa, postico basi cordato, lateralia basi obliqua inter se et cum pede columnæ coalita, fusca, bases versus lutescentia,

maculis, rubris brunneis. Pet. concoloria reflexa, marginibus ut etiam sepalorum revolutis, linearia, angusta.

Labellum, 1¼ uncialium cum pede columnæ tremulo articulato, sessile 3-lobum, lobis lateralibus rotundatis, ascendentibus erectisve, lutescente, viridia maculis rubis brunneis-extus ut basis labilli albida, terminate basin angustato late cordato, ovato fere deltoideo atro-brunneo-purpureo mixto, repandiusculo, centro incrassato convexo, longitudinaliter sulcato, lateraliter pulchcrime venoso, pagina supra tantum elevatis venis distinctis ab eis in centro elevato.

Cristæ 3, inter lobos laterales, albæ callosæ valde elevatæ, harum intermedia falcata valde incompleta, ultra laterallium perfectorum apicis prominulâ.

Dentes 2, vel processus lanceolato erecto eadem consistentia, utrinque ad basin cristæ lateralium adest linea ab terminatione currens arcuata, ad basin lobi terminalis desinentis aurea.

Columna semiteres ascendens, sursum simplex, antice valde dilatata et producta in calceolum, centro convexum, basin quasi saccatum, vel concavum, aurantiaceum cæterum albidum, rubro brunneo crebre maculat. Stigma transversa margine inferiori intus bi-gibbosum ! Columna apice 3-dentata, dente postica distincta tantum anth. affigent.

Anthera semi-immensa, superne carnosa, bilocularis longitudinaliter dehiscent. septo oblique transverso parum elevato luteo duplicato.

Pollinia 4 cerea, aurea, obovato-oblonga hinc complanatis collateralia, oo oo. Labellum carnosum infra atro-purpureum læve, parte medio plana lutescente.

Clinandrium obmargines columnæ elevatas profundum, medio septatum longitudinaliter. Rostellum obsolete-truncatum, obsolite-bilabiatum.

Hab. Khasyah Mountains. Assam Herb. 168.

Obs. Species perpulchra, vere grandis insignisque a Lindleo optimo modo vix descript. Congener est Dendrobii fuscescentis Griff. a quo hoc modo distinquendum. Folia ovato-lan-

colata apice subæqualiter bifida plicata. Sepala petalaque acuminata *obtusa* marginibus revolutis. Labelli lobo terminal. supra venis elevatis insignito. Columna basi subexcavata An genus proprium.

Churra: Oct. 25*th*, 1835.

4. *Dendrobium fuscescens*, Gr. Pl. CCCIX.

Rhizomat. filiform. repentib. Squamis pallide castaneis vestit. pseudobulbis oblongo-attenuatis, basi squamis laxis paucis castaneis stipatis, striatis. Foliis binis, oblongo-lanceolatis 1-nervis subcoriaceis oblique emarginatis, apice semi-tortis; flore unico, in pedunculo, basin squamis vaginantibus membranaceis læte sed pallide castaneis.

Per. subexplanatum. Sepala oblongo-lanceolata, acuminatissima reflexa, præsertim lateraliaquæ basi obliqua et cum pede columnæ parum elongato saccum formant. Pet. linearia angustissima acuminata longitudine sepal. Labellum cucullatum cum pede columnæ articulat. elasticæ, 3-lobum, lobis lateralibus oblongis insuper columna ascendentibus, terminale obcordato, integro plano, basi cristis 3, elevatis, basin lobi medium prope desinentibus, intermedio apice tantum distincto.

Columna arcuata lata, præsertim pes elongatus, basi et medium prope maculis 2, pallide aurantiaceis, apice dento postice anther. affingent. subelongato, Clinandrium medio septatum.

Color petal sepalorumque fusco-carnea, labelli loborum lateralium margines castanei, lobo medio pallide castaneo medio parum elevato, saturatius colorato nitido.

1. Plant rather longer than natural.
2. Flower front view of.
3. Lateral view of column and labellum.
4. Do. of column.
5. Front view of column.
6. Incumbent face of anther with 2 pollinia in situ.
7. Incumbent face of pollen mass.

8. Superior face of do.
9. Lateral view of a pair of do.
10. Ovary transverse section of.
11. Portion of base of labellum shewing its cristæ.

HAB. Khasyah mountains Assam Herb. 149, 16, 60. *Churra : Oct.* 17*th*, 1835.

OBS. Anthera nondum visa. Ovar. maturius clavatum, 3-costatum. Per. marcescens rubro-aurantiaceum.

This species is allied to D. amplum Lindl. and with it forms a section approaching very closely indeed to Bolbophyllum. The middle of the labellum is fragile at the base, and breaks off readily at that situation. The sepals are 1 ½ inch long. The petals about a line shorter. The anterio-posterior diameter is nearly 3 inches, the lateral measuring from the reflexion of the sepals 1 ¼, across the labellum and base of lateral sepals ½. The labellum towards its base is purplish, the crests are white, the lateral ones being sulcate longitudinally at the base, the disk of the middle lobe has membranaceous margins, the central acutely triangular part being fleshy. The sterile carpillary leaves are very broad, and scarcely intrant, the fertile are lageniform and meet in the centre ; the ovules are few. These have a single vascular fascicle, the sterile have however several, and the texture of the inner and outer halves is very distinct; length of labellum ¾ inch. *Churra : Oct.* 20*th*, 1835.

5. *Dendrobium Lindleyanum.* Gr. Pl. CCCVIII.

Caulis saltem floriferius pendulis, vaginarum reliquus membranaceis arcte adhærentibus omnino vestitis, pedalibus, internodiis clavatis.

Racemi biflori per bases vaginarum fol. fulcient erumpentes, basi bractea membranacea grisea lata. Pedunculis, 1½ uncialis, basi bractea albida scarioso-membranacea involuta, fusco-rubra.

Flores maximi speciosissimi odorati, postice diametro transverso 3-uncialis, antico posticoque brunneali rosei.

Sepala linearia obtusa, 7-venia, longitudine 1½ uncialia

lateralia basi obliqua cum pede columnæ connata, vel venulis transversis nexæ.

Pet. ovata obtusa, eadem longitudine ac sepala duplo latiora, 8-lineæ transverse, ut sepala rosea, pulchre venosa, venis 3, centralibus tardius cæteris sub 3-nis fere immediate ramosis.

Labellum magnum: trumpet-shaped posticum quam maxime cucullatum, margine utroque id est sine ordine fixo super involuto, deorsum curvato.

Lamina cordata, basi densissime papilloso-velutina. Color albus, tubo vel cucullo, intense sanguineo purpureo venoso, et os versus totam insigniter colorata est, margine extremo laminæ roseo tincto. Lab. cum columnæ basi articulat. Columna nana, semiteres 3-dentata, dentibus lateralibus latis denticulatis terminale antherum affingente subulato.

Pes elongatus concavus paullo curvatus, basi excavatus in loculam clausam basi labello 1-calloso. Color albus, pes sanguineo purpureo lineatus tinctusque, loculus ejusdem coloris et ut pedis basis lucida.

Clinand. profund. paries inferior obliquus. Anthera mobilis fere immensa directione stigmatis, connectivum valde carnosum, velutino-papillosum antice 3-cristata, cristis rotundatis posticum fissurum, dente affigente fissura quasi latente, post dehiscentia bilabiata, loculis parvis ovatis medio longitudinaliter et incomplete septatis, septis geminatus.

Pollinea 4, per paria accumbentia lutea cerea, exteriora majora.

Stigma elongato quadratum, sub clinandrio. Rostellum bilabiatum, labeo inferiore truncato emarginato, superiore involuto.

Hab. In margifera indica *Suddhya*: *April* 14*th*, 1836.

Obs. D. Pierardi affine, ast meum e Mergue D. Pierardi sit distinctissimum. Vix D. nobile ob sepala linearia nec ovalia, caules foliosi vaginis rubro-maculatis omnino tecta, fol. distichi-lanceolata, apice oblique sub 9 venia, venulis interjectis.

D. Lindleyanum. Caulibus floriferis pendulis teretibus, foliis lanceolatis vel oblonge-lanceolatis apice obliquis distichis floribus geminatis racemi spurium formantibus, sepalis linearibus, petal ovatis obtusis, labelli cucullati, lamina cordata.

P. S. The following is an additioual description of the same species as met in flower in the Patkye Mountains: *May 10th*, 1837, and from which the drawing referred to was taken.

Lab. cum pede columnæ excavato-articulatum breviter unguiculatum ungue supra processum transverso clausa.

Pollinia 4-extrorsum arcuata, distincta, sed cohærentia aurea.

Epiphytica species D. moschato valde affinis, variat floribus amplioribus roseo magis tinctis tesselationeque distinctiore. Caules penduli, foliorum vaginis purpureo-venosis, foliis distichis lineari-oblongis apice obsolete obliquis mucronatis. Racemis pendulis multifloris flexuosis, basi præcipue bracteato-squamatis.

Floribus posticis, si ad axin plantæ spectes, anticis vel resupinatis, si ad terram amplis, inodoris. Sepala lineari-oblonga acutiuscula, marginibus plus minus rovolutis, lateralibus interdum apices versus ½ tortis.

Pet. orbiculari-obovatus obtusissimis. Color perianth cream coloured, marginem versus purpurascens et purpurascente venosus, more tesselato, color purpur. extus saturatior.

Labellum cucullat. cochleariforme subintegerrimum, lobis lateralibus obsoletissimis vividissims purpureo-sanguineis per dimidium super, infer faintly veined; lamina tomentosa fere alba, cristæ tres integerrimæ purpureo-fucescentis, basi cuculli nuncupant. Columna horizontalis vel sæpius deflexa! pedem purpurascentem subæquans, alba. Anthera alba.

6. *Dendrobium Moschatum.*

Caules aggregati, longissimi, penduli; floriferi nudi longiores et numerosiores 3-4-pedales, sursum attenuati, sulcati, annulati; interspatiis annulorum vaginarum reliquus griseo-albidis vestiti.

Foliiferi 2-2 ½ pedales, basi nudi. Folia disticha lanceolata, obtusa læte viridia, supra lucida, marginibus subrevolutis, supra inconspicue-venosa, subtus 9-venia.

Racemus cuique caule unico lateralis, per basin vaginæ erumpens, pendulus, spithamæus pedalisve, glaberus flexuosus, multiflorus, basi squamis truncatis vaginentibus approximatis, inferioribus et interdum omnibus contiguus, viridibus albido-punctatis stipatus.

Bracteæ (suffultientes) ovato-oblongæ, obtusæ, herbaceo-membranaceæ, concavæ, patentissimæ, vel etiam subreflexæ, venosæ, pallide viridescentes, pedicellis 3-plo duplove breviores.

Pedicelli lucidi, læves, virides, ovaria glabra, excedentes.

Flores resupinati (posticive) 9-12 maxime, speciosissimi, odore Rhubarbico sed gratiore, diametro longitudinale 3-unciales, transverso 3 ½ unciali.

Perianth. albido cream coloured, venosa, initio e tessellatum carneo-purpureove tinctum; demum et cito pallide aurantiaceo purpureo minus tinctum, et conspicue tessellatum.

Sepala oblongo lanceolata, lateralium basibus connatis, calcare spurio luteo aurantiaceis.

Pet. paulo longiora, duplo vel 2½ latiora, late ovata fere subcordata repanda obtusa. Labellum vix unguiculatum! pulcherrimum et obformam et obcolorem,cochleariforme, diametro longitudinale 1½ unceali transverso, unciam paullo excedente, extus a medio infra glabrum fusco-aurantiaceum, lamina purpurea venosa et parte abrapte inflexa alba processubus albis, fimbriatis, rarius simplicibus, dense villosâ fimbrato ciliatâ intus basin laminæ versus utrinque maculâ amplâ, atro-sanguinea nitidissime coloratâ infra striatâ, supra punctata insignitum, inconspicue 5 venium, venis cristato-ciliatis, basi utrinque callo inconspicuo aurantiaceo antice evanido notatum.

Columna nana semiteres, dorso anticeve purpureum, lateralibus albidis, purpureo notatis, postice ut plurimum stigmata ovuli nuncupata, marginibus læte purpureis.

Pes valde dilatatus, medio lutescens, cæterum læte purpureum, maculis oblongis, binis, lutescentibus stigmatis basin prope interjectis, imo pede quam maxime excavatus; hicque lateraliter aureus, fundo viridescente, antice callosus.

Anthera purpurea, loculorum parietes albi. Pollinia pallida lutea.

Dens antheram affingens subulat. longissimum, purpureum. Clinandrium parum profundum obliquum. Rostellum album bilabiatum lab. inferiore truncato carnoso, superiore membranaceo involuto vel quoad clinandrium revoluto, vix elastico.

Hab. In mangifera indica *Suddyah, June* 25*th*, 1836.

Obs. Omnia D. moschato sed racemi multiflora. It is one of the finest of the Asiatic Orchideæ.

7. *Dendrobii sp.*

Caulibus subpendulis 2-3 pedalibus, junioribus tantum foliosis, angulatis, vaginis foliorum fere omnino tectis, fusco. Fol. oblongo-lanceolata acuminata venosa.

Racemis lateralibus et pseudo-axillaribus, folia duplo vel ultra excedente, flexuosis, basi bracteis vaginantibus squamatis. Pedicellis 1½ uncialibus, bracteis lanceolatis multo longioribus, floribus conspicuis magnis, 1½ unciali subodoret.

Sepala oblonga patenta lateralibus in calcar breve spurium, connatis, aureis. Pet. concolor majora, crystallina, marginibus denticulatis.

Labell. cucullat. limbo rotundato pulcherrime fimbriato; fimbriis laceris splendide aureum repandum papillosum, macula transversa atro-purpurea ad basin limbi, persistente cucullato intus aurantiaceo-striata.

Columna lutea marginibus linea purpurea angustissima notata pede aureo, excavato. Anth. albida connectivo maximo, bilocularia.

Pollinia flavida *oblique*, dente postica columna *rigida* subulata. Ovarium viridium.

Hab. In Mangifera in oppido Tenasserim: *Feb.* 1835. This is a lovely species, apparently very nearly allied to D. fimbriatum.

Mergue Herb. 1040.

8. *Dendrobium tri-petaloides.* Roxb.

The pseudobulbs of this species owe their whitish partial flocculent appearance to the existence of an external layer of cellular tissue on which numerous fibrous cells are developed, these cells vary much in form from round ovate to oblong, which last have the appearance of obtuse spiral vessels, in these the fibre is incomplete and the ends generally dilated. They are easily unrolled, and then present the appearance of a compound spire the direction of the fibre is from left to right?

9. *Dendrobii* sp.

Caulescens, 3-6 uncialis, caulibus superem attenuatis, inferne vaginam reliquis obtectis, fol. vaginantibus lineari-oblongis, venosis apicibus obliquis.

Racemis flexuosis pseudo-extra axillaribus, foliis breviorib.

Bracteis membranaceis longitudine pedicellorum, floribus albis inconspicuis.

Per. explanat. Sepalis linearibus acutis, postico libero, lateralibus basi valde obliquis, inter se et cum pede columnæ elongato in calcare conicum demum subincurvum connatis. Pet. conformia, angustiora, alba.

Labellum cucullatum cum pede columnæ continuum lanceolatum a medium supra, pulchre sinuato repando crispatumque, albidum, venulis læte viridescentis lineis approximatis, 3-clavatis albis a basi ad medium usque current.

Columna nana semiteres pede multo brevior apice denticulata, dento postica *media* subulata, reliquis longiora anther affingent. Anth. 2-locularis, loculis obsolete 2-locular, connectivum grande carnosum. Pollinia 4, maxima per paria cohæ-

rentia collateralia oo oo. Rostellum sub 0. Columna pes abbreviatas.

HAB. Mergue, *Merg. Herb.* 808.

OBS. D. pygmæo affine.

10. *Dendrobium pumilum.* Roxb.

Caulibus 4-5 acuto-angulatis subulatis sursum incrassatis ibidemque angulatis, apice bifoliis.

Floribus capilatis e paleis ortis, nutant. majusculis albidis, suave odoratis,*apertis* nempe sepalis lateralibus bases usque fere discretis.

Labellum oblongum subintegrum lineis lutescentibus 2, in macula transversa oblonga viride terminant. Columna utrinque alata. Pollinia 4, oblonga per paria collateralia.

HAB. Mergue, epiphytia in arborib. *Mergue Herb.* 24.

11. *Dendrobium crumenatum.* Roxb.

Caulibus suberectis simplicibus vel parce ramosis basi fusiforme-clavatis.

Fol. distichis vaginis lævibus uncialibus ore transverso, lamina lanceolato-oblonga vel ovato-oblonga, subtus leviter concava coriaceo-marginata.

Racemis terminalibus paucifloris, seu plurifloris, quasi denudata gracilis nutansque.

Floribus subsecundis sæpius non resupinatis, cylindraceis amplis albis, suave odoratis.

Per. explanato-recurvum. Sepalo tertio petalisque subæqualibus, slightly undulating, sepal. lateralibus latior. basi obliquissime.

Labellum elast. articulatum, 3-lobum, subcucullatum directione columnæ, lob. later. obliquis obtusis. centrale oblongo margine recurvo undulato, cristis 5 inconspicuis luteis apicem versus albis.

Columna pede longissimo rectiusculo, with 3 elevated lines of which the centre is very conspicuous.

Rostello margo super involutus, inferus emarginatus.

Pollinia interiora angustiora.

HAB. On trees Malacca and Singapore. It is either D. crumenatum or D. angulatum.

12. *Dendrobium ericæflorum*. Gr. Pl. CCCVII.

Epiphytica in arborib.

Caulescens, spithamæa: caulibus articulatis, articulis vestigiis vaginaram scariosis brunneo-striatis tectis, fol. lanceolatis, 2 uncialibus 1-veniis apice oblique emarginatis racemis duplo breviorib.

Racemis terminalibus et oppositifoliis. in hoc casu vere axillaribus et per vaginæ basin erumpentibus, bracteatis, plurifloris, bracteis linearibus membranaceis, lanceolatisve, pedicellis duplo brevioribus, pedicellis ovarium etiam excedente, floribus majusculis posticis elegantibus, lutescente albidis, labello viridescente fusco pulchre venosa.

Per. subexplanatum. Sepala linearia acuta, $\frac{1}{4}$ uncialia lateralia basi valde obliqua, apicibus recurvus, inter se et cum pede columnæ elongato, columne in calcar spurium coalitis concoloribus. Pet. erecta subconnivente linearia angusta, sepalorum longitudinum, venis 3, sanguineis quarum intermedium longiora.

Labellum cum pede columnæ articulatum recurvum arcuatumve 3-lobum, lobis lateralibus acutiusculis et marginibus labelli cum his continuis, subfimbriato-dentatis, terminale lato transverso undulato. Crista elevata carnosa viridia, apice acuta, supra planiuscula, sed sulcata a labello basi fere ad basi lobi intermedii currit.

Columnæ basi producta in pede oblongo, columnam paullo excedente, apice subexcavato viridescente purpureo crebremaculata, semiteres simplex, apice sub 3-dentata, dente postica anthera affingente, Rostellum membranaceum revolutatum! Clinand. margines denticulat. Anth. terminalis mobilis opercularis, connectivum carnosum bilocularis longitudinaliter dehiscentibus.

Pollinia 4, cerea, per paria collateralia oblonga, æqualia.

HAB. Khasyah Mountains. Assam Herb. 230. In Ceraso, *Myrung: November 9th,* 1835.

OBS. Omniæ æriæ, anthera exeepta qua Dendrob. An Dendrobium denudans. Don. Lindl. Orch. 84.

D. *Æriæflorum* nob. Caulibus sursum attenuatis articulatis cæspitosa articulis vaginis arctis solubilibus vestitis. Racemis terminalibus oppositifoliisque, floribus posticis. Pet. linearibus, labelli 3-lobi, lobis lateralibus fimbriato-dentatis, terminale repando.

13. *Dendrobium flexuosum.* Gr.

Caulescens, caulibus subflexuosis inferne nudis, vel potius vaginarum reliquis obtectis, sulcatis pilis atris hirtis, fol. lanceolata bifaria, pilis brevibus atris hirto, apice oblique emarginata.

Racemis paucifloris, interdum unfloris, foliorum limbis oppositis ideoque vere axillaribus bracteatis, bractiis concavis carinatis membranaceis acuminatis, pedicello ovarioque paullo brevioribus, pilis similibus hirtis. Ovarium glabrum, alabastra acute 3-gona angulo tertio postico, calcarata, calcare subulato conico obtusa. Sepala lateralia basi valde obliquo inter se et cumpede columnæ coalitæ et calcar formantia.

Pet lanceolata utrinque attenuatu.

Labellum longe unguiculatum cum pede columnæ articulatum 3-lobum, lobis lateralibus rotundatis venosis, medio acuto, repando, crispato subfimbriato, lineis 3, parum elevatis viridescentibus. Columna nana pede 3-plo brevior 3-dentata, dente media postica antheram affigent. Anth. terminalis directione vere horizontalis, bilocularis.

Pollinia 4 accumbentia per paria complanata. Rostellum bilabiata, lab. inferior vertical. emarginato superior ascendent. revoluto vel potius quand ejus axin involuto supra papillosum minuta. Ovarium maturius obovato pyrifome carnosum.

HAB. Khasyah Mountains. Churra in arboribus. Assam Herb. 162. *Oct. 20th,* 1835.

Obs. Proximum videtur D. longicornu a quo distingutur forsan.

D. flexuosum nob. Caulibus hispidis flexuosis, erectis, foliis lineari-lanceolatus *breviter pilosis*, apice oblique emarginatis, floribus racemosis opposetifoliis terminalibus, bracteis pedicellos æquantibus: ovatis hirtis, sepalis lateralibus in calcar obtusum conicum cum pede columnæ connatis, petalis lanceolatis utrinque acuminatis, labelli 3-lobi longe unguiculati, ungue libero lobo medio crispato-dentato

Pedilonum Blumii.

14. *Dendrobium hirsutum*. Gr. Pl. CCCV.

Flores nutantes solitarii vel germinati e pedunculo bracteato. Per. album carnosum longitudine obsoleto-sulcatum. Sepalis acuto carinatis, calcar longo subulato obtuso decurvo. Pet. univenia e carinata. Labell. lobo lateralibus obsoleto denticulato medio fimbriato albo, venis aurantiaceis papulosis.

Pollinia 4 per paria collateralia magna. Anth. alba.

Hab. In arborib. Churra Ponjee, Khasyah Herb. *Itinerary Notes p.* 42, *no.* 670.

15. *Dendrobium striatum* Gr.

Epiphytice in arboribus: rhizomat repent filiformibus pseudo-bulbis subglobosis parce vestitis *floriferis* et senioribus rugosis, folia solitaria longiuscule peliotata, petiole canaliculato, ovato-elliptica emarginata quam maxime coriacea, 1-venia.

Racemi radicales bracteati, folia subæquantis, 2-3 flori, florum bracteæ pedicellis duplo brevioris. Flores postice majusculi pulchri.

Per. connivento-explanatum, sepala postico lanceolato, acuto, lateralibus subcarinatis, paulo majoribus, basi subobliquis inter se et cum pede columnæ connatis, herbacea, sanguineo lineato-punctataque. Pet. conformia nana patentissima.

Labellum cum pedæ columnæ elongato-articulatum mobilum sed nec tremulum, carnosum lanceolatum integerrimum sessile, basi utrinque obsolete dentatum ibidemque viride-albidum carneumve lineis 3 centralibus rectis sanguineis, quarum medium ad basin labelli tantum currit. lateribus pulchre sanguineo-venosum, marginibus lutescente viridibus.

Columna semiteres pede elongato paulo longiora cum columna angule fere recte formant. punctulis purpureis minutissimis notat. pedis apice subdilatato.

Anth. terminalis opercularis dento posticæ subulato-setaceo columnæ cæterum subintegræ affixæ, carnosa, crista coniforme, bilocularis, loculis longitudinaliter dehiscentibus.

Pollinia 4-perparia collateralia oo-oo discreta interiora paullo minora cerea, lutea materia viscida 0.

Ovaria capsulæ, oblongæ 3-costata, costis placentis sterilibus respondent. 3-tia antica !

Hab. Legi, in Queris spicum : Mumbree *Nov.* 11*th*, 1835. Assam Herb. 236.

Congener Dendrobii ampli, fuscescentis etc, quæ ut Lindleus ast Bolbophyllis proxima, antheræ columnæque Dendrobium. cæterum Bolbophylli.

Dendrobium striatum *nob.*

Pseudo-bulbis 1-phyllis, globosis, foliis ovato ellipticis e marginatis coriaceis longe petiolatis, racemis *radicalibus.*

16. *Dendrobium crepidatum.* Gr.

Epiphytica, caulescens fasciculata.

Caulibus junioribus squamis arcte vestientibus verrucosulis, verrucis potiis papulis viridibus senioribus basi foliorum vestiguis tecte, superne læves, virides cylindracei, apice alternatim. bifolii, fol. lanceolata, elongata acuminata 3-nervia, carnosa coriacea.

Racemus terminalis basi squamis vetustis bracteoque convoluta sub carinata foliacea acuminata stipata, flores subsessiles in prominence caulis, brevis articulati, basi bracteati, bracte lineari-membranaceo, ovario pluries brevior, subodorat.

Per explanatum albidum. Sepala lanceolata obtusa lateralia basi obliqua inter se et cum pede columnæ brevi coalita et gibberem formantis.

Petala sepalo supremo conformia. Sepala petalaque basi externe fusco purpureove tinct.

Labellum cum pede columnæ articulat. sessile, subcucullatum 3-lobum, lobis lateralibus rotundatis denticulatis extus albidis, intus castanco rubro pulchre-lineatis et quasi venosis; terminate oblongo acuto reflexo : revoluto crispato marginibus castaneo rubro-maculatis, extus albidum, medio luteo : basi bicristata, crista alba sublacera basi versus lobo terminalis in custis 2, undatis cito lutescentibus paulo infra apicem desinentibus abeunto; centrale quinto interjecto breviore ut etiam interdum 1 utrinque, margines versus omnibus brevior.

Columna subsemiteres basi in pedem parum curvatum, columna subæquanta producta, lutescens, sanguineo tincta.

Anthera terminalis dente postica columnæ subobsoleto affixa : valde convexa, bilocularis.

Clinand. excavat. columna mempe in dorso ejus producta, septatum.

Rostellum membranaceum, breve obtusum.

Pollinia 4 pulverea quasi formacea oblonga collateralia : subcurvata, cito in stigme cadentia.

Pollinia 8, quaternate cohæsentia materia viscosa obsoleta forsan nulla, 2 postico clinandrio (quoad antheram) minora, et sub exteriore, 2 antica oblongo complanata duplo majora. Anthera fere hippocrepidiform.

Hab. Khasyah Mountains. Assam Herb. 165. Churra *Oct.* 23*d*, 1835.

Obs. Genus distinctus obformam antheræ.

Aclinia.*

Per. membranceum connivens. Sep. libera æqualia, linearia acuta. Pet. conformia. Labellum sepaloideum, lineari-lanceo-

* From *a* priv. and *kline* lectus.

latum acutum integerrimum. Columna nana semiteres, apice denticulata. Anth. 2-loculat. Pollinia 4-per paria cohærentia collaterallia oo-oo. Clinandrium obsoletum.

Caulescens fol. disticha. Racemi pseudo extra axillares, rachiformes, flores inconspicui albi.

Orchid. Pleurothalleæ Ex charactere videtur *Dendrochilio affinis.*

Acliniæ, sp.

Caulescens, caulibus inferne attenuatis, flexuosis vaginam reliquis vestitis, fol. lineari-venosa, apicib. æqualia, submucronata repanda. Racemis pseudo extra axillarib. folia subæquant. bracteatis, flexuosis rachiformibus. Bracteis membranaceis longitud. pedicell. Pedicellis ovaria æquant. cum iis clavatis, floribus inconspicuis albis.

Per. connivens. Sepalis linearibus, acutis, æqualibus, liberis, albis. Pet. conformia, minora, alba. Labellum sepaloideum lineari-lanceolatum, acutum integerrimum, marginibus medium supra involutis, nervo medio albo, venulis lateralibus viridescentibus.

Columna nana semiteres. Anth. terminal. bilocularis, connectiva carnosa.

Pollinia 4, oblonga, collateralia. Clinandrium sub 0.

HAB. Mergue: 1834. Mergue Herb. 809.

OBS. It has the appearance of Dendrobium, but would seem to be a new genus allied to Dendrochilus.

CONCHIDIUM.

Conchidium pussillum, Pl. CCCX.

Minima dense cæspitosa. Pseudo-bulbis, valde depressis bifoliis, fol. subsessilibus obovato-lanceolatis in petiolum attenuatis, apice setosis. Pedunculis terminatis filiformis, solitariis unifloris folia excedent. apice ad ovarii basin bractea

cucullata acuminata membranacea, floribus subnutantibus ratione plantæ magnis, albis subhyalinis. Scapus sæpissime biflorus, flore altero abortiente.

Per. subconnivens a medio supra tantum nempe subpatulum subhyalinum. Sepala lineari-lanceolata, acuminata, lateralia valde obliqua, cum pede columnæ in saccum obtusissimum coalita. Pet. sepalo postico conformia minora.

Labellum lanceolatum subcarnosum cum pede columnæ articulatum, apice versus crenato-repandum Columna nana, pede arcuato multoties brevior.

Clinand. profunde excavatum, dorso alato marginatum.

Rostellum transversum oblongum truncatum, medio sulcatum.

Anth ex maxime parte immersa, bilocularis, loculis obsolete 4-locellatis. Pollinia 8-per paria cohærentia 4 superiore minima.

1. Plant natural size.
2. Pseudo-bulb viewed underneath.
3. One removed, shewing the *axis* to be radical.
4. Bud.
5, Flower lateral view.
6. Do. sepals removed.
7. Column and labellum lateral view.
8. Column and anther, lateral view.
9. Do. do. front view.
10. Column, lateral view portion of the margin of the clinandrium removed.
11. Anther, lateral view, the pollinia partially extracted to shew their relative situation.
12. Do. vertical view.
13, 14. Do. some of the Pollinia removed.
15. Pair of Pollen masses.

HAB. Cherra Ponjee in arboribus. Assam Herb: 143. *Oct. 13th*, 1835.

Phreatiæ ex charactere videtur proximum.

Spathoglotis.

1. *Spathoglotis Khasyana* Gr. Pl. CCCXI. Fig. I.

Pseudo-bulbi conici, fol. linearia coriacea acuminata scapi erecti, 2-3 flori, pubescentes, flores basi bracteato ovarium pubescens.

Per. explatum. Sepala oblongo-lanceolata, obtusa patente-reflexa lutea. Pet. patentissime subobovata, eodem colore. Labellum sanguineum basi maculatum cum pede columnæ continuum, basi gibbosum, 3-lobum lobis lateralibus oblongo-quadratis, subconniventibus, sanguineo-tinctis, intermedio bilobo porrecto marginibus revolutis, basi cristis 2, elevatis basi sanguineis, ultra margines vel apices loborum lateralium vix attinentibus donatum; 3 tio base ultra clavata, 3-angulari, ad fissuram attinente. Columna utrinque marginata subulata lutescens. Anth. terminalis; clinandrio semi-immersa. Postice biloba, bilocularis, locellis sub 4-locellatis. Pollinia 8 quaternate ope caudicularum pulverearum cohærentia obovata complanata. Rostellum integrum.

Hab. Khasyah Hills. In rupibus subaridis *Churra*: *Oct.* 12*th*, 1835.

2. *Spathoglotis lilacina*, Gr. Pl. CCCXI. Fig. III.

Terrestris, subacaulis. Axis basi subtuberosa, vaginis laceris fibrosis cinct. Fol. petiolis base vaginant. cæterum conduplicato-canaliculatis sulcato-costatis, foliis terminalibus subpedalibus, lamina lanceolata elongata acuminata plicata.

Leaves altogether 3-4 feet long, subnutant et subsecunda. Scapus hinc e basin axis erumpens folio subæquant, teres viridis, hinc illinc squamata, apicem florifer.

Bracteæ inflorescent. concavæ subcuspidatæ ½ deflexæ initio colore florum cito marcescente et omnino reflexæ, pedicellos subæquant.

Flores majusculi lilacini, secundum nutantesque.

Ovarium non tortum, oblongo-cylindraceum, sed flores resu-

penati ob pedicellos tortos. Sepal. Petalaque patentia demum erecte conniventia in illa lanceolata subacuta æqualia concava, hæc (petal. ovata, patentiora planiuscula.

Labellum 3-lobum, lobis lateralibus oblongis truncatis ascendentibus bruneo-lilacinis, centrale longe-unguiculato, obcordato porrecto ad basin unguis, tuberculæ 2, connatæ lutescentes rubro punctulatæ versus centrum, intus parce villosa, et ad basin externe villosa margine ungius hic cuive subreflexa, et denticulata. Columna pede subsimplice, obsolete cæterum arcuato marginato et versus apicem subulato uti petala et lilacina

Anth. terminalis ½ immersa shaped like a jockeys cap, the cells are not produced downwards as in the Mount Ophir species, *S. plicata,* or in *Bletiæ;* but are nearly horizontal.

Clinandrium: margo 3-dentata, dente terminal. multo majore obtuso.

Rostellum, a conspicuous ascending tooth, the stigmatic surface reaches to the very edge of the clinandrium, so that impregnanation can take place without the removal of the pollen, æstivation of the sepals valvate.

The lower edge of the stigma is curved or thickened as it were, from being recurved.

Hab. Paludosis umbrosis insulæ Pulo Bissar. May. 1842. Khasyah mountains, Churra Ponjee: 1837, *Itin. Notes* p. p. 28 and 31, nos. 429 and 493, Pl. CCCXI. A.

Obs. Fecundation is common, to all stages of development, from the bud to the fruit on each raceme.

Pollinia 8, obovata compressa, anth. valde attenuata in caudicula pulverea, apicibus quaternate cohærentia.

Although the mature anther is only 2-celled, it is 8-celled when young, and for this reason alone I would not separate the genus from Bletia, besides in the Mount Ophir one, the anther is essentially that of Bletia, and that species cannot be separated from this.

S. lilacina nob. Foliis (maximis) lanceolatis acuminatis,

plicatis scapo folium æquant. Bracteis reflexis per anthesin lilaciniis, floribus, lilacinis, labello edenticulato, tuberculis connatis basi villosis, centro subpennicillatis lobo medio obcordato, stigmata margine inferior incrassato recurvo.

Capsulis, oblongo-ellipticis obtuse 6-costatis, pedicellis pubescentibus.

All the others have yellow flowers, yet this is a genuine species.

3. *Spathoglotis plicata*, Gr. Pl. CCCXI. Fig. 11.

Flores ampli aurei. Per. explanatum. Sepalis ovatis æqualibus venosis suberectis. Pet. latiora et paullo majora venosa ejusdem directionis.

Labellum *profunde 3-lobum*, lobis lateralibus basilaribus *parallelogramicis* vel *subspathulatis*, terminalibus porrecto (hastato when spread out) trilobo, lobis lateralibus nanis ascendente incurvis, centrale spathulato *reduplicato*, cristæ 2, auriculiformes, erecti divergentes inter lobos laterales nanos, extus concavæ, centro sulcatæ.

Columna. clavato ½ teres, arcuata basi pede brevi *producta insuper labellum* basin, marginata, apice alata, antice sulcata.

Anthera ovate cup-shaped, *bilocular*.

Pollinia 8 obovata, per paria incumbentia quaternatim cohærentia, superiora majora, *materia pulverea*.

Clinand. margo integer, perpendicular to the column.

Rostellum deflexum lamelliforme, stigma immediately subrostellate.

1. Flower, lateral view, about the (natural size).
2. Do. perianth reflexed.
3. Column and labellum.
4. Same, one of the lateral lobes removed.
5. Column and labellum in front, the central lobe of the latter rather deflexed.
6. Anther in front.
7. Do. behind, *no pulverous matter*.

8. Pair of lobes of pollinia.
9. Do. laid side by side.
10. Four Pollinia lobes, as they lie in the anther.
11. Lateral view of column.
12. Front view of the apex of do. *a* clinandrium, *b* rostellum *c* stigma.
13. Long section of the upper part of the column, *a* clinandrium, *b* rostellum, *c* stigma.
14. Transverse view of the ovarium, the three upper costate sulca are much less deep.

The drawings have been made from a specimen in spirits.

Hab. Summit of Mount Ophir; a stately plant with acute *curculigoid* leaves.

Obs. There is no pulverous matter to make it *Malaxideous*, and in the clavis it answers to *Dilochia*, but in the generic characters of that genus, the pollinia are said to be 4.

It is allied to *Cœlogyne*, *Cyrtopodium*, *&c*.

Bletia.

1. *Bletia bracteosa* Gr. Pl. CCCXII.

Rhizomata bulbive? subterranea, forma varia alba carnosa, interdum vere rhizomatiformia hinc illinc annulata, folia longissime e parte distincta orta, linearia, plicata coriacea, senilia tantum vidi 2½ pedalia.

Axis florifer. valde elongata erecta, 3-4 pedalis, fuscescens lævis, glabra, fere omnino et infra medium omnino, vaginis scariosis laxis striato-venosis acuminatissimis, præsertim superioribus tecta, inter flores subpubescens.

Flores racemosi spatium spithamæum apices axeos occupantes, resupinati, ovaria pedicellique pube minuta velutina. Bracteæ scariosæ lineares angustissimæ acutissimæ albidæ, brunneo-striatæ, ovaria longe excedentes vel summaquæ tantum acutatæ vix dimidium superantes. Alabastra postica, postice planiuscula antica convexa.

Perianth. ringens explanatum album, rosaceo-striatum punctatumque, 5-venium, venis 4-lateralibus, apice evanidis? exterioribus minus conspicuis. Sepala æqualia discreta lineari-oblonga acuta. Pet. lineari-spathulata apice triangularia sepalis 3-ties angustiora.

Labellum cum basi columnæ continuum vix articulat. sub mobile! subcucullatum 3-lobum, lobis lateralibus subovatis acutis, terminale subcordato paullulum reflexo, discus carnosus latiuscule spathulatus, e cristis 5 valde carnosis transverse lobulatis, viridibus, centrale paullo longiore colore albus purpureo-tinctus vel maculatus, discus viridus. Labelli basis extus pubescens.

Columna semiteres lineam longa dorso pubescens, superne dilatata, et quasi 3-loba, lobo postico anthera, affigente; lateralis stigmatibus binis occupata excavata stigmataque ideo cucullata sunt.

Anthera terminalis rugosula atro-brunnea maculis 2 brunneis antica sitis notata, mobilis, decidua, bilocularis, loculis dimidio 4-locellatis.

Pollinia 8 accumbentia cerea obovato-pyriformia, faciebus contiguis complanata, ope materiæ flavæ, flexuosæ, cohærentia.

Glandula nulla. Caudicula una pulverea cuique pollinio quarum hæ infima affigentia longiora sunt. Ovarium pubescens, oblongo-ovatum.

1. Flower enlarged about 3 times.
2. One of the sepals.
3. Do. petals.
4. Labellum.
5. Column in front.
6. Ditto behind.
7. Anther back view.
8. Do. incumbent face. Pollinia in situ.
9. Do. do. pollinia removed.
10. Pollen masses viewed laterally.
11. Do. do. the pairs separated.

12. Column viewed in front, anther removed.

13. Labellum front view.

Hab. Assam. Assam Herb: 415 *March 7th*, 1836.

Obs. Basis columnæ antica quasi geniculata, e pubescens• cum basa labelli saccum brevem efformans. Anthera fere immersa, clinandrio profundo. Rostellum nullum, vel potius brevissimum rotundatum certe Bletiæ species.

B. bracteosa, foliis lineari-ensiformibus longissimis scrotinis, scapis bracteis scariosis acuminatis vestitis, floribus racemosis, cristis labelli carnosis lobatis, fere confluentibus, columna dorso pubescente.

2. *Bletia densiflorus* Gr. Pl. CCCXIII. Fig. II.

Terrestris rhizomata repente, fol. bifariis imbricatis, subsecundis, vaginis latis laxiusculis, late ensiformibus, vel angusti-lanceolatis, acuminatis bipedalisve, venosis plicatisque a mediis nutantibus.

Scapus pseudo-radicalis, vero axillaris hinc per basin vaginæ erumpens, subpedalis,hinc illinc vaginis albis inflatis, lanceolato-ovatis acuminatis vestitus.

Racemus densiflorus, bracteis caducis primo conniventibus in cornuum obtusum lineari-lanceolatis, albis acuminatissimis, flores multoties superantibus apice vestitus.

Pedicelli breves ovariaque glabra, flores parviusculi expansi penduli nutantisve lutei, calcare multo magis pallido, alabastra bracteis tecta ascendentia.

Perianth. posticum connivento-ringens. Sepala oblonga breviter acuminata lateralia basi paullo obliqua.

Petala obovata pallidiora *brevioriter* acuminata.

Labellum calcaratum, calcare ovario dimidio fere breviore clavato recurvato, lamina biloba, basi utrinque auriculata, medio bicristata, aurea, lobis albidis, parte media unguem laminæ quasi referente columnæ omnino adnata.

Columna lineam longa semiteres, faciei anticæ marginibus cum labello adnatis supra *dorso* 3-dentata, dentibus rotundatis, stigma transversa, apicem columnæ occupans.

Anthera terminalis opercularis, membranacea alba, connectivum minutum, bilocularis, loculis longitudinaliter dehiscentibus, obsolete 4-locellatis, clinandrio demidio immersa.

Pollinca 8, obovata, pulverea albido lutescentia faciebus contiguis complanata quam ternata cohærentia.

Caudiculæ totidem apicibus confluentes pulvereæ.

Rostellum obsoletum.

Hab. In co llibus Naga dictis in umbrosissimis detexit D. McClelland.

Obs. Vix Bletiæ species discrepat. generæ a Bletia *bracteosa*. Labello calcarato cum columnæ alte adnato, antherâque obsolete 8 locularia. Potius Phaii sp.

Arundina.

1. *Arundina bambusifolia* Lind. Pl. CCCXIV.

Planta terrestis, caulis teretis, vaginis arcte adpressis, stramineis omnino obtecte. Folia linearia acuminata, plus minus torta subcoriacea obsolete canaliculata striata.

Racemus terminalis pauciflorus, bracteis, vaginantibus, carinatis, brevibus, quarum infimæ vacuæ.

Flos anticus magnus, (pedicello brevi). Perianth. carneum, Labellum rosaceum lobo medio saturated *carmine*.

Per. explanat. Sepalis linearibus uncialibus, basi ima herbaceis, involuto-canaliculatis apicibus callosis.

Pet. horum longitud. sed obovata venosa.

Labellum cum columnæ basi continuum cucullatum, lobis lateralibus obsoletis rotundatis, terminale bilobo, sinu dentigero basi velutina, cristis 3, quarm laterales irregulares integræ vel varie divisæ, undulatæ basin lobi medium attingunt. tertiæ centrice multo minor et brevior, macula saturata carmine, subelevato-cordata, ad basin lobi med.

Columna superne, subalata, semiteres longa ; clinand. integro. Rostellum magnum carnosum integerrimum, stigmatis paries inferior sublobatis ! Anth. terminalis opercularis carnosis

bilocularis, loculis obsolete 4-locellatis. Pollinia 2, utrinque 4-lobum, materia pulverea parea, vero e 8 massulis format.

Ovar. glabrum.

Arundina bambusafolia, Lindley, Orchid. 125.

Fol. distichis sed certe non plicatis.

Anth. loculis bilocellatis, loculis obsolete, iterum obsolete locellatis. Pollen facile solubila.

1. Flower just expanding.
2. Do. opened, viewed in front.
3. Labellum and column.
4. Labellum laid open.
5. Column.
6. Do. anther removed.
7. Anther with pollinia viewed from beneath.
8. Section of anther between the cells.
9. Pollinia laid open.
10. Pollinia of one cell.
11. Pollinia viewed in water.

2. *Arundina affinis* Gr.

Erecta spithamæa 1½ pedalis ; fol. ascendente, linearia acuta coriacea atro-viridia 5-nervia, nervis minoribus binis quaque interjectis. Spica terminalis. Bracteæ ochreæformes, breves, ovario 4-plo breviores, flores distantes. Sepala oblongo-lanceolata plurivenia obtusa, patento-reflexa, carnea.

Pet. oblongo-ovata, obtusa 1-venia.

Labellum cucullatum, marginibus supra columnam *convolutis*, 3-lobum, lobis lateralibus obsoletissimis, terminale oblongo, bifido, crispato repando, bicristatum ; cristis carnosis elevatis sinuatis, venosis, purpureis ; saccum medio læte lutescens, cristis luteis bases versus purpureis.

Columna semiteres clavata apice marginata, margine in antheram supra incumbent. 3-dentata, dente media antheram affigente.

Rostellum deflexum obsolete 3-dentatum, dente media majore, potius truncat. lateraliter introflexum.

Anth. dorso carnosa, subbicallosa antea membranacea bilocularis, mobilis, loculis obsolete 4-locellatis.

Pollinia 4, quaternatim cohærentia, supero posticove minore, accumbentia.

Caules basi in cormum dilatatæ, axillæ foliorum interdum plantiferæ!

HAB. Khasyah Mountains, in graminosus aquosis. *Churra: Oct. 16th 1835. Assam Herb.* 150.

OBS. Aspectu certi differt ab Arundina bambusifolia vix non species distincta hoc modo distinguenda.

A *foliis ascendentibus* atroviridibus nervis 5, cæteris conspicuosioribus, sepalis petalisque obtusiusculis, rostello columna latiore. Flores minores. Per. carneum. Pollinia alba.

A *Bumbusi folia;* foliis distichis, patentissimis recurvis luteo-viridibus, nervis conspicuosioribus subseptemis, sepalis petalisque acuminatioribus. Labello medio tri-cristato, cristis lateralibus basi processum curvato arctis, columna apice marginata, rostello latiore, flores duplo 3-plove majores. Pet. sepalaque albida.

Pollinia, discretiora lutescentia.

TRICHOSTOSIA.

Trichostosia biflora Gr. Pl. CCCXV.

Caulescens: vaginis completis ferrugineo-hispidis, limbis foliorum lineari-lanceolatis: præacuminatis obtusis carnosis coriaceis 1-veniis, apice longe et conspicue unilateralibus, bifariis ascendentibus.

Racemis spicisve oppostifoliis ex ore vagina exeuntibus, basin bractea cupulari donatis, foliis multoties brevioribus.

Bractea maxima conduplicata concava navicularis subflorem utrinque. Flos, vix resupinatus unilabiatus, extus pubescens.

Sepala postica oblongo-lanceolata in labellum quasi re-

cumbens, lateralia medium supra carinatis, basin obliquis cum pede columne connatis, in calcar clavato spurio, carinis in alabastro valde conspicuis.

Pet. sepalo postico conformia minora.

Labellum directione columnæ spathulatum carnosum, apicem conduplicatum intus præsertim in parte supera dilatatio, papillis villosa.

Columna elongata, semiteres, (that is the face opposite to labellum is very flat,) papillis similiter labello pubescente.

Clinand. 3-dentat. dentibus latis.

Rostellum simplex porrecto-decurvum. Anther ½ immersa like a cap with the peak raised so as to expose great part of the cell, 8-locularis, loculis infimis majoribus. Pollinia 8-Stigma transverse subrostellate.

1. Plant natural size flowers however drawn too large.
2. Back view of inflorescence.
3. Front view of do. 4*a* alabastrum.
4. Lateral view of the flower.
5. Column and labellum seen laterally.
6. Do. labellum deflexed partly.
7. Labellum seen in front.
8. Column and anther seen in front.
9. Anther seen laterally.
10. In front. 11. Behind *vertical* view.
12. Pollinia (not seen so perfectly as they are drawn.)
13. Anther in front, one cell open, shewing it to be 4-locular.
14. Column seen in front, its foot cut away.

Hab. Malacca. On trees Mount Ophir, above Puddam Bhatoo.

Obs. Certainly allied to Aporum and to Dendrobium. An Trichostosia *pauciflora* Blume.

Xiphosium.—Gen. Novum.

Xiphosium acuminatum Griff. Pl. CCCXVI.

Itinerary Notes p. 78, no. 1153.

Acriopsis.

Acriopsis, Pl. CCCXVIII.

Racemus subnutans hinc illinc squamatus bracteatus, apice flexuosus.

Bractea squamiformis subflore quoque parva.

Flores postici geniculati, sub deflexi, pedicellos ovarioque fuscescens brunea.

Perianth. arcuatum subconnivens, laciniis 4, spathulato-oblongis, exterior antico posticoque scaphiformibus, longioribus et angustior, interior concavis.

Labellum cum columne altiuscul. connatum, trilobum: lobis lateralibus erectis, marginis revolutis; antice gibbum; centrale cordato reflexo patens, cristis 2, elevatis triangularibus purpureis, color albus purpureo-tinctus.

Columna apice dilatata emarginata antice(clinandrium) rostello bicrur. cruribus longis? asendentibus artice bicorniger, cornubus diversum arcuatis, apice glandulosis luteis, dorso brunnescens.

Anthera clinandrio recondita, subhelmet-shaped, bilocularis membranacea.

Pollinia 4, per pariam, arcte coalita, antea arcuata ascendent. lanceolato-obovata planiuscula. Caudicula longa. Glandula carnosa oblonga

1 Plant natural size. 2. lateral view of bud.

3. Lateral view of flower.

4. Front view of flower; *4a* front view of Labellum.

5. Lateral view of Column and Labellum, and of bud no 2.

6. Lateral view of the upper part of Column, one lobe of its apex cut away to shew the anther, etc.

7. Lateral view of column and labellum.

8. Section of compound (posticous) sepal shewing the vernation.

8. Ditto of simple anticous ditto.

9. Front view of column.

10. Anther seen from beneath, ditto vertically.
11. Lateral view of ditto.
12. Back view of Pollinia etc.
13. Lateral view of ditto.
14. Inner view of one mass, shewing that it presents the usual composition.

HAB. In old orchards on trees. *Malacca : Jan.* 1842.

OBS. It is a different speceis from the Mergue one.

Herba rhizomata repente, fibro-squamata, pseudo-bulbis sulcatis confertis apice folia bina linearia coriacea canaliculata integra gerentibus.

ORNITHIDIUM.

Ornithidium coccineum Pl. CCCXVII. from the Epsom Garden 1831.

1. Flower detached ; natural size.
2-3. Flower viewed differently.
4. Do. Sepals removed.
5. Labellum and Column.
6. Column and anther, labellum removed.
7. Apex of the column with the pollinia attached.
8. Anther with its cells.
9. Pollinia and gland.
10. Front view of the column and stigma.

SARCOCHILUS.

Sarcochilus lilacinus Gr. Pl. CCCXX. Fig. II.

An irregularly decumbent Plant.

Caulibus purparescent. (vaginis exceptis) vaginis medio cris, subancipitis. Foliis cordato-ovatis, apice recurvis carnossissimis, margine recurvis, basin auriculatis, auriculis amplexicaulibus idoque fol. perfoliata videntur.

Spica flexuosa compresa acute tetragona, angulis angustioribus excavatis, bracteis conduplico-carinatis, brevibus vaginantibus, distichis.

Per. posticum, ovar. bract. plureis excedens, erectum subconnivens.

Sepalo antico (tertio) concavo oblongo, lateribus 2-3 ties majoribus, oblongo-ovatis planiusculis cum columnæ pedem connat. basi valde obliquis. Petal. sepalo antico similia sed paullo breviora.

Labellum carnosum cum pede columnæ articulatum, basi saccata, sacco (longitud. emarginato) columnæ faciem posticum applicit. cucullatum 3-lobum, lobis lateralibus minus carnosis acinaciformibus, apice dentatis, centrale subdeflexo, conoideo solido-papilloso celluloso. Crista carnosa. Processusve intus labellum versus basin lobi centralis, (the floor of labellum) pubescent along the centre.

Columna nana, pede planiuscula, longa, apicem utrinque insert. articulumve labello dente aucta.

Clinandrio integro, supeficiali, margines postice incrassati, (over the stigma.) Rostellum subintegrum.

Flores spicati, pedunculo simplice e basin vaginarium erumpent. (the outer being the same as the lamina, hence they are truly axillary) hinc illinc squamati vaginat. Rhachis florigere compressa, acute tetragona flexuosa, bracteis squamiformibus carinatis vaginantibus distichis approximatis, or the rachis is flexuose, and excavated, on its two narrower margins.

Flores postici mediocres pallide lilacini.

Per. explanatum, sepalis oblongis concaviusculis lateralibus majoribus basi obliquis.

Petala paullo minore oblongo-ovata.

Labellum, (perpendiculum) cum pede columnæ elongat. articulat. saccoque basilari magn. emarginat. 3-lobum, lobis lateralibus scimitar-shaped, small; centrale carnosissime, callus elevatus transversis medium labell. versus.

Ant. membranacea profunde terminalis, bilocular.

Pollinia 4, obovata incumbentia, posticis multo minoribus flattened, in gladula triangulare reniformia reticulata! sessilia.

What is this? it is impossible to determine. It is a *Vandea* according to Lindley and Endlicher.

It approaches in character to *Sarcochilus*, and certainly has a rather strong affinity to Dendrobium.

CYMBIDIUM.

1. *Cymbidium affine* Gr. Pl. CCXCI. Fig III.

Subacaulis; foliis petiolatis distichis linearis loratis regidiusculis, basi equitantibus semitortis, apice oblique bifidis.

Racemo axillare foliis breviore, bracteis basi vaginantibus, concavis, maximis, accuminatissimis bifariis omnino vestito, floribus breviter pedicellatis, subsecundis (alabastris erectis,) pendulis? bractea membranacea acuta, pedicello duplo breviore, ovario glabro fucescens. Sepala petalaque albido-herbacea.

Per connivens. Sepala linearia obtusa subbiuncialia concava, lateralia basi suboblique et obsoletissime saccata. Pet. sepalo postico conformia.

Labellum cucullatum, circa columnum vix convolutum, 3-lobum, lobis lateralibus subcuneatis, terminale obcordato, basi facile secedente, repando denticulato, cristis 2, basin versus obsoletis ad basin lobi terminalis confluentibus et conum parvum prominulum luteum formant. ad basin cum columna accretum et saccum formans.

Columna elongata fere 1½ uncialis semiteres vix clavata, anguste marginata apice obsoleto 3-denta. Rostellum integrum.

Stigmatis margo antice et inferne et centraliter convexus.

Anthera *superficialis* terminalis suborbicularis bilocularis longitudinaliter dehiscens, septo obsoletissime.

Pollinia 2 hinc fissa e 2 duplicato repando incumbentibus formata, cerea, matereis viscida pulverea subcopiosa cohærentia.

HAB. Khasyah Mountains. *Churra: Oct.* 21*st*, 1835. Assam Herb. 167.

Cælogyne affine a quo differt in habitu, polliniumque numero, No. 164 anne congener hujus.

Columna antice convexa centrum versus apicem versus marginata marginibus intus inclinatis. Pollinia an demum separabilia.

2. *Cymbidium densiflorum* Gr.

Epiphytica in arborib. Caulescens, foliis distichis basi subequitantibus, supremis longissimis 2-pedalibus loratis apice emarginatis, nutantibus, *rectis*. Petiolis dilatatis, supra fere convolutis.

Racemus ex axillis foliorum vetustorum, foliis *longioribus* brevior pendulus, parte e florifere bracteis magnis foliaceis, acuminatis compresso-carinatis, laxe vaginantibus tectis, densiflorus,pedicellis ovaria æquantibus, bracteis minutis membranaceis duplo longioribus, floribus posticis magnis lutescentibus inodoratis.

Sepalis connivent. lineari-obovatis *conformibus*. Petalis ejusdem directione formaque sed angustioribus.

Labelli vix cucullati, lobis lateralibus oblongis, terminate porrecto, basi lata, lamina subobcordata, emarginata, cristis apice confluentibus basi processum dentatum conniventes gerentibus.

Columna parum arcuata, obsolete marginata.

Rostellum bifidum, lobis acutis. Pollenia 2 in glandula sub 3-angularia, materia ope pulverea, elastica affixa, sessiliæque, postice et secus marginam exterioram longitudinaliter fisse, obovata.

Glandula *verticaliter* quadrata.

Hab. Khasyah Mountains Myrung: *Nov.* 29*th* 1835. *Assam Herb.* 229.

The following observations apply also to this species.

Epiphyt. Fol. arcte disticha, basi equitantia lorata apice acuminata coriacea semitorta.

Caule spithamæa, foliis omni tect.

Racemis a medio supra pendulis axillaribus, bracteis longissimis foliaceis acutis convolutis basi tantum amplexicaulibus distichis tecte, parte pendula nuda, compressa, flocis basi bracte lanceolato, pedicellum brevem album paulo superante donat. postica quoad axin plantæ magnæ, speciosæ, albæ. ovarium glabrum. Per. connivens. Sepala æqualia linearia, acutiuscula, 2-unciali, lateralia omnibus ima basi connatis. Pet. conforme sepalo postico sed angustiore.

Labellum cucullatum basin versus cum columne continuum et saccum formans, 3-lobum, lobis lateralibus rotundatis, terminale oblongo integro repanda, cristæ 2, luteæ medium labellum versus tantum distinct. et basin lobi terminalis connivent. ibidemque terminant.

Columna elongata clavata semiteres marginata, marginibus subinflexis apice denticulatis et obsolete marginatis ideoque anthera omnifere exserta.

Rostellum sub declinatum truncatum obtusissimum.

Pollinia 2, obovata, anticum materia pulverea donat. sed fere discreta. Anthera bilocularis.

Surureem in Sylvis, *Nov.* 2*d*, 1835. Assam Herb. 184.

Labelli lobo terminali basi pubescens, foliis subsecundis.

Ovarium ovatum, costis 3, convexis, 3-planis.

3. *Cymbidium syringodorum.*

Caulescens. Caulibus foliorum vestigiis omnino tectis, fol. basi equitantia disticha lorata, apice emarginata, breve petiolata, petiola lata infra vaginanta, supra libera convolutaque, 1-torta et præsertim ad apicem versus semitorta, coriacea *nutantia.*

Racemus axillaris, foliis paulo brevior, a parte florifera basi usque bracteis convolutis, foliaceis amplissimis acuminatis, laxe vaginantibus (summis majoribus) vix. distichis tectus, apice nutans, pluriflorus : parte florifera sulcatis.

Flores maximi postici albi, odore *lilacino,* pedicellis albidis, ovariis paullo brevioribus, bracteus late ovatus acuminatus sphacelatus, membranaceus duplo fere excedentibus.

Sepala oblongo-linearia, 1½ uncialia, postico latiore, lateralia basibus paullo angustata omnibus, apice cucullato mucronatis. Pet. linearia, conformia, reflexo-patula.

Labellum cucullatum 3-lobum, lobis lateralibus rotundatis integris; terminalia basi lata crispata sinuata, basin lutescente, cristis lateralibus basin labellum versus 2, 1-utrinque obsoletis cum columnæ basi in saccum brevem coalitum.

Columna elongata arcuata utrinque marginata, basi glanduloso lutescens. Clinandrium superficialium, ob columnum apices margines abbreviatissimas. Anth. terminalis mobilis opercolaris, bilocularis.

Rostellum late emarginatum deflexum medio quasi carinatum. Stigma immediate infera, margo inferne undulata.

Pollinia 2, cereacea, in glandula diaphana transversam 4-gonam, in emarginatione rostelli arctiusculi fixam, ope materia pulverea affixa et sessilia obovato-pyriformia, margini posticæ glandulæ opproximatæ luteæ, secus margines externos fissæ.

Hab. Epiphytic. Khasyah Mountains *Myrung: Nov. 10th* 1835. *Assam Herb.* 228.

Obs. From this species it is evident that *C. densiflorum* and *C. affine* are true Cymbidia, and that I had overlooked the gland in both these, from its firm attachment and apparent confusion with the rostellum and the easily separable pollinia. The pulverous matter which led me to associate those species at first with Cælogyne, is in this species curved outwards and from it the pollinia are quite distinct.

4. *Cymbidium carnosum.*

Epiphyt. Caule breve, foliis subdistichis loratis, a medio basi versus concavis coriaceis, 1-veniis.

Racemis radicalibus fuscis, hinc illinc bractea convoluta, foliacea venosa acuta, 2½ unciali, paucifloris, floribus basi bracteatis, bractea lanceolata concava acuta, pallide viridescentia, maculis saturatioribus; pedicellis excedentibus. Gratissime odoratis.

Per. explanatum. Sepalis æqualibus linearibus uncialibus, acutis 1-veniis viridibus. Petalis brevioribus ast latioribus columna insuper conniventibus.

Labellum cum basi columnæ articulatum tremulum subcarnosum 3-lobum, lobis lateralibus obsoletis revolutis, terminale oblongo acutiusculo revoluto, cristis 2, albis callosis longitudinalibus ad basin loborum lateralium.

Columna subclavata, subsimplex semiteres, leviter arcuata basi quam parum oblique producta. Clinand. margine brevissime denticulato circumcincte, fere perpendicul.

Anth. terminalis superficialis, carnosa alba, bilocularis, loculis directione verticalibus obsolete bilocellatis.

Pollinia 4 incumbentia antica majora perparia cohærentia in glandulo transversa oblonga alba sessilia.

Rostellum profundum emarginatum quasi lunulatum.

Labellum albo-viridescens sanguineo-saturatum maculatum: maculis præsertim loborum lateralium confluentibus, cristæ conniventes.

Hab. Khasyah Mountains. Assam Herb. 185.

5. *Cymbidium triste.*

Epiphytica in arboribus; caulibus crassis, fusco-viridibus, vaginis foliorum arctis tectis, foliis tereto-cylindraceis mucronatulis cum vaginis articulatis, viridibus, junioribus plus minus rubro-tinctis. Inflorescentia vere axillaris, aspectu oppositifolia spicata abbreviata, squamata, squamis subdistichis arctis. Fructus capsula brevissime stipitato, stipito semitorto, clavata coriacea 6-costata, quarum 3 petalis labelloque oppositis eminentioribus.

Hab. In arboribus, Myrung et Nunklow. Aspectus omnino Cymbidii tristis.

The following refers to the same species.

Per. membranaceum explanatum. Sepala ovata postico paulo minora, concava præsertim lateralia. Pet. sepalis conformia sed paulo longiora subconniventia. Labellum sessil-

medium versus constrictum, limbo cordato, subacuto basiventricosa. Columna declinata, semiteres, anthera obsolete 2-locularibus valvis dorsalibus 2, articulatis. Pollinia 2, integra, antice foveolata caudicula lata ovata. Glandula lata, obtusa.

Pet. sepal. fusco-viridia maculis rubris. Labellum viridiscens, maculis confertissimis elevatum, columna viridescens maculis rubris.

It has the same sort of inflorescence as *Dendrob. angulatum!* although the limb of the leaf is cylindrical, and articulate; yet the petiole entirely embraces each internode of the stem, the inflorescence bursts out at the lower part of the sheath and is strictly axillary.

Hab. Mergue : *September*, 1834. Mergue Herb. 267.

6. *Cymbidium giganteum.*

Epiphytica in arborib. Pseudo-bulbis ovatis, 3-uncialibus longitudine basi vestiguis foliorum vestitis, cæterum basibus dilatatis foliorum omnino tectis. Fol. disticha, petiolis basi quam maxime dilatatis et caule pseudo-bulbosa amplectentibus cæterum 1½ uncialibus concavis, et subconvolutis linearis acuta et obsoleta, apice obliqua apices versus semitorta coriacea, supra nitida venis distinctis sub 5, directione ascendente, patula vel nutantia.

Racemus radicalis, patens recurvave ? viridis lucido glaberrime, ad exsertione cujusque pedicelli incrassata, bracteæ basi latæ cæterum lanceolatæ membranaceæ pedicello arcte suffultiente. Pedicellis glabris subcylindraceis, ovaria glabra nitidaque paullo excedentis.

Flores postici maximi, valde speciosi, diametro transverse 3-unciali vel 2½, verticale 1½; odora Tulipæ hortensis sed minus forte, secundi.

Per. connivento-patens. Sepala subconniventia æqualia oblongo-lanceolata acuta, antico labello columnam superimpositæ. Color albidus, venis 8-10 rubro-castaneis, mutuo trabeculis concoloribus nexis.

Pet. linearia, sepalo postico paullo longiora patentissima, concoloria, acuta.

Labellum cucullatum cum basi columnæ elasticum ! continuum et cum ea gibberem saccumve formans, 3-lobum, lobis lateralibus oblongis, terminati subcordato crispato, pubescens, bicristata, cristæ parum elevatæ, basin lobi terminalis versus conniventes, et in lineis pilis albis erectis barbatis apicem versus lobi terminalis currentibus abeuntes, interstitiis, bases inter lineis rufis 3-notatis, quarum intermedia longior. Cæterum color. loborum lateralium sepalis similis, lobo terminale tantum maculato nec venosa.

Columna paullo arcuata semiteres dilatata castaneo rubro saturatius tincto, quasi venosa.

Clinandrii margines parum elevati, dente postice antheram, offingente obtuso. Rostellum deorsum direct. lunulatum directione axeos transversum.

Pollinia persistentia, anthera nempe decidua, glandula diaphana oblonga transversa sensu sub 3-angulari affixa et sessilia, ope materia elastica, cujus processus utrinque subulatus extrorsum reflexus, 2 posticea potuisve ob florum situm immulatum antice fissa, 3-angularia, parum convexa e 4 formata, quorum, 2 *antice* minora, margines secus interiores cum posticis majoribus omnino confluant, cerea, lutea.

Anthera terminalis opercularis mobilis, connectivo carnoso, sub-bigibbosa bilocularis, loculis, matura vix discretis, obsoleta bilocellatis.

Clinand. dorso vel apex columnæ *anticus,* omnino castaneo infus. Per. externe fuscescens, rufo-venosum marginibus apicibusque albidis.

HAB. Khasyah Mountains Nunklow in arboribus. Assam Herb. 265. *Nov.* 17*th,* 1835.

7. *Cymbidium grandiflorum* Gr. Pl. CCCXXI.

Itinerary Notes p. 145. Bootan Herb. 698.

8. *Cymbidii* sp. Pl. CCCXIX.

Terrestris. Caule fusco viride ut pseudobulbi. Radices tomentosæ cinereæ, squamæ cinereæ. Petiolus livide viridis uti scapus. Bracteæ cinereo-fuscæ.

Flores antici. Perianth. fusco-brunneum.

Labellum lutescens, cristæ inconspicuæ fuscescentes basi purpurascens, pallidæ, columna albida ad basin pedis brevis macula rubra.

Anth. lutescens fere immersa, lobulis purpureo-maculatis, Pollinia 8, ternatim 4 collateralia lutea, glandula nulla, rostello nempe integro, materia viscosa.

Hab. Namtuseek. In collibus *Patkaye* vix infra alt. 3500 ped. *Journey from Assam to Burma : March* 17*th*, 1837.

9. *Cymbidii sp.*

Planta Terrestris.

Rhizoma suborbiculare depressum. Scapus pedalis erectus anti folia evolutus, sordide purpureus basi versus pallidus sursum inter flores sulcatus.

Squamæ vaginantes paucæ medium vix attingentes, fuscescentes. Bracteæ florum setaceæ, ovaria subæquantæ sæpius reflexæ.

Flores resupinati parviusculi inodori fusco-purpurascentia, ovariis saturatius coloratis. Perianth. initio connivens ringens, pet. sep. demum ascendente secundis. Sepala acuta lineari-lanceolata lateralia paullo majora basi obliquisculi.

Pet. lineari-spathulata paullo breviora et latiora.

Labllum subcucullatum cum columnæ pede brevi continuum, breviter et obtuse calcaratum trilobum, lobis lateralibus rotundatis, medio oblongo repando. Cristæ 2, obsoletæ simplices medium versus labelli calcar intus atropurp.

Columna semiteres, basi in pedem brevem product, viridescens. Clinandrium integrum superficial. pariet. postica sursum in dentem product.

Rostellum bifidum. Stigma transversum reniforme.

Anthera bilocularis sursum in apiculum dentiformem emarginatum producta. Dente clinandrium affixa.

Pollinia 2, oblonga lutea arcte approximata postice basi profude ex sculpta. Pl. CCCXX. Fig. III.

Caudicula latiuscula, Glandula sub 3-angularis.

HAB. in campis Bamo, specimen unicum vidi.

Affinitate propinque Cymbidio. *Journey from Assam to Burma : May 2d,* 1837.

CYPRIPEDIUM.

Cypripedium insigne Pl. CCCXXII.

Itinerary Notes p. 74, no. 1129.

GRAMMATOPHYLLUM.

Grommatophyllum paludosum Gr. Pl. CCCXXIII.

Herba terrestris paludosa 1½ pedalis.

Folia: vaginis laxis sursum completis *cum lamina continuus,* structura et consistent.

Laminis equitantibus, conduplicato-carinatis, subfastigiatis, substrictis oblique ascendentia, vena centrale (carina) duabusque, laterali extus prominent. reliquis striiformibus, vaginarum exceptis, quâ intermediæ distinctiores, ad os vaginæ ramulis simplicibus transversos nexæ.

Flores racemosi. Pedunculis axillaribus, folia longe excedent. teretibus hinc illinc bractea vaginant.

Racemus ad apicem, tenuis, pauciflorus, bractea brevi ovato-oblonga concava cuique flori. Fl. breviter pedicellati (ovario longo) nutantes, albi, maculis rubris expagina exterioris, suave odoratis.

Per. explanatum. Sepalis petalisque subæqualibus, reflexis, et sursum subsecundis, sepalis ima basi connatis.

Labellum cum columnæ basi connatum ibidem gibbum vel subsaccatum, unguiculatum porrectum, ungue planiusculo

columnæ elastice supposit. medium circiter utrinque 1-dentatum, lamina lanceolata, cuspidata extrorsum semiconduplicato-carinata, unguc intus, carinâ, cuspidaque barbatos villosis.

Columna breviuscula robusta sursum marginata a medio infra pubescens, intus apice 3-dentata, dente postica e basi lata mucronata, antherum affingente, lateralibus rotundatis cum margine continuis. Clinandrium superficial. Anthera membranacea terminalis, *profunde* bilocularis.

Pollinia 2, oblonga, postice fissa, utrinque in caudiculam curvatulum *basi connatum* affixo-erecta.

Glandula magna, viscosa, subobovata ad insertionem caudiculæ quasi constricta. Stigma parva. Rostello emarginato vel bilobo inflexo.

Hab. Malacca. In Paludibus Ayer Punnus, cum Nepenthibus 2, Arnoldia? Hypericum, and Lycopodium cernuum.

Obs. It comes near to Grammatophyllum, with genuine species of which it agrees in habit, but if the structure be the same in others, the character is very erroneous, and yet the *glandula arcuata* presumes an error.

Dried it looks like a Cymbidium. It is related also to Eulophia.

Terrestris fol. equitantibus conduplicatis, strictis, racemis folia longe excedentibus. Fl. albi maculis externis rubris.

2. *Grammatophyllum Scandens* Gr. Pl. CCCXXIV.

Arborea. Caulibus longis subvolubilibus, laxa adhærentis, omnino vaginis obtect. radiculis crebre immissis on the adhering side passing out from the mouths of the vaginæ.

Fol. distichis subæquitantibus vaginis cum lamino confluentibus consimilibus.

Lamina conduplicato-concavis subcarinatis, interdum plus minus planifactis pallide viridescentis plus minus recurvo-patentibus recurvis, summis ascendent. imo etiam incurvis. Articulo vaginæ transverso, alte sito.

Racemi pauciflori, foliis paullo longiores axillares robuste hinc illinc squamis oblique insertis vaginantibus.

Flores subsecundi, apicem versus dispositi, pulchri straminei; maculis sanguineis, extus conspicuis, intus quasi immersis.

Per. patentissimum sub-unilateralium. Sepalis petalis spathulato-oblongis, his paullo minoribus, illis lateralibus basi paullulo obliquis, luteis maculis dorsalibus saturatis sanguineis centralibus diffusis et quasi immersus.

Labellum venosum basi sacculatum et cum columne continuum utrinque unguis, medium circiter dente oblongo,columnæ lateraliter appliciter lobo terminale subcordato, breviter cuspidato conduplicatulo carinato, carina barbata præsertim apice ungue faciei anticæ (column closely and elastically applied) pubescens, hairs simple long as if excurrent from the carina and covering the apex and margnis to a considerable extent. Columna brevis. sursum marginato alata, pede concavo paullulo producte, in this forming half the sacculus of the labellum, medium circiter dense villoso pubescen.

Clinand: very superficial, with scarcely any marginal attaching tooth, the floor convex, three ribbed as it were. Rostell. bicrurate, cruribus inconspicue. Anth. terminalis carnosis bilocularis, loculis profundis.

Pollinia 2, hinc postice fissa, caudicula arcuata, basi connata et transversim affixa, glandula magna viscosa, oblongo rotundata medio constricta, the caudiculæ are fixed to the pulverous or glandular matter exserted from the fissure near its base.

Grammatophyllum scandens.

Epiphyta, fol. recurvo patentibus conduplicato concavis, apices versus sæpius planiusculis, pedunculis foliis paullo longioribus labello lobo terminali planiusculo.

Perianthium explanatum, etc.

The spots in both species disappear in spirits.

Labellum album, venis purpureis, conduplicatis, outwardly much less than in the paludose species.

This differs from the preceding in habit and foliation, but the

characters of the flower are pretty much the same, so far as words go.

Arguments are suggested by this species in favour of the ternary nature of the pistil, and the so called additional carpellary leaves do not appear to have any placental surface.

1. Plant reduced as to foliage about $\frac{1}{3}$.
2. Flower seen in front.
3. Labellum and column lateral view.
4. Labellum in front. 4 one of the *hairs*.
5. Anther lateral view.
6. Anther, under surface vertical view.
7. Pollinia front view.
8. Do. back.
9. Do. obliquely laterally.
10. Column in front.
11. Do. laterally and rather obliquely.
12. Apex of column back.

Acanthophippium.

Acanthophippium ringiflorum Gr. Pl. CCCXXV.

Terrestris, Pseudo-bulbi inverse obovato-clavati, subampullacei, maximi spithamæi. hinc illinc (semel bisve) sulcati, medium supra reliquus vaginarum membranaceas gerentes.

Fol. pauca infimo scariosa ad vaginam reducta, summo sesquipedale, lanceolata, acuminata, 5-7-venia, subplicata, supra saturatam viridia lucidaque, infra subglaucescentiam : vaginæ conspicue 4-angulati.

Scapi solitarii, uno duobusve exaxillis squamarum foliacearum, pseudobulbi novelli senioris basi affixi et apice folia novella convoluta exserentis, abbreviata, 4-5 unciales, pauciflori, purpureo-tincti. Bracteæ magnæ, concavæ, membranaceæ.

Flores racemosi postici maximi, longitudine biunciali transverse unciali. Ovaria alba, $1\frac{3}{4}$ uncialia, costæ ovar. obtusæ in pedicellum longe decurrentes.

Perianthium ringens, subcarnosum. Sepala oblonga, postico unciali, lateralia quam maxime oblique, cum pede columnæ elongato et basi inter se coalita, albida, apices versus et præsertim intus rubro-purpureo maculata.

Petala concoloria, concava, longitudine sepala postica cui supposita sunt, lanceolato obovata.

Labellum cum pede columnæ longissimo continuum, longe unguiculatum, ungue unciali, lineari-concavo, lutescente, pallide rubro maculato linealoque.

Lamina 3-loba, lobis lateralibus subparallelogrammicis antice productis, albis, intermedio linguiforme lutescente deflexo exsertaque; 5-cristata, cristis postice valde clavatis, intermedius confluentibus terminantibusque; centrali in lobum producte sed hic parum prominula et intra apicem evanida.

Columna teres, clavata, pede curvato, 3-lineato, uncialia fere. Stigma grande apicem columnæ occupans.

Clinandrium valde profundum, margo integer postica elevatior.

Anthera terminalis, mobilis, opercularis, carnosa, cuculliformis, bilocularis, loculi membranacei, fusci, obsolete 4-locellatis marginibus albis plicato-sinuatis subcrenatis.

Pollinia 8-quaternatim cohærentia ope materia pulverea caudiculas breves formanti, superiora anticaque rotundata, faciebus accumbentibus planis, ratione inferiorum oblongorum minima.

Rostellum verticale rotundatum integerimum.

Glandula nulla.

Hab. Brought by my collector from the *Abor* Mountains on the Northern boundary of Upper Assam: *May*, 1836.

This appears to me to be of the same genus with one lately published by Dr. Lindley from materials sent from Ceylon by Mr. Watson. It is a very distinct one.

Eulophia.

1. *Eulophia inconspicua* Gr. Pl. CCCXXVI.

Caulis basi obovato-tuberosus, tubera annulato vestigiaque vaginam ostendens.

Scapus 3-4 pedalis simpliciter racemosus glaucescens, squamis (loco folior.) distantia stipat.

Flores bractei anguste suffulti, pedicello longitudine ovarii secundi, mediocres inconspicui resupinati.

Petala sepala linearia lanceolata, apices versus reflexa oblique patentia herbacea viridescentia venis fuscescentibus, (petala paullo breviora.)

Labellum columnæ parallel. 3-lobum, lobis lateralibus subconnivente, opposite to the head of the column rounded, terminal lobe broadly obovate or rotundate, margine undulato-plicato, disco ramentaceo rumentis vel processubus irregularibus in lineis simpl. dispos. Calcare ovario duplo brevior, late clavato, clavo emarginato. Color albidus lilacino, venatus, processus tinged with the same, and contiduous with the base of the column.

Columna cum ovario continua semiteres, ambito-spathulata, concave on the inner face.

Clinandrium produced behind into a conspicuous posticous tooth, shallow.

Anther not immersed, connective produced upwards into a large fleshy cuneate 3-lobed crest, trisulcate anteriorly.

The Stigma is a pit in the broadest part of the apex of the column.

Pollinia 2, oblongly round, postice foveolato, fissa, caudicula, brevis.

Glandula solubilis indistinct.

Rostellum indistinct.

Capsule oblong, perianth terminal.

The tubers were brought in from the jungles, and flowered during Sept. and Oct. The flowers last a very long time. Impregnation followed by fruit occurred only in one.

The anther differs in form from any I remember to have met with.

1. Flower viewed laterally.
2. Under surface.
3. Labellum and lobes seen laterally.
4. Front of column and labellum, this being deflexed.
5. Column etc. lateral view.
6. Do. front. Pollinia removed. Anther reflexed.
7. Do. Pollinia in situ. Anth. removed.
8. Pollinia, seen posteriorly.
9. Do. anteriorly, masses pulled out to shew the mode of attachment.

HAB. Malacca, 1842.

2. *Eulophia.*

Herba terrestris caulis e foliorum basibus format. subpedalis vaginis striatis omnino tectus.

Folia pedalia vel fere bipedalia, anguste lanceolata infra attenuata acutiuscula coriacea triplicata trivenia, luteo-viridia.

Scapus 4-5-pedalis, viridis, teres, glaber. vaginis pluribus longissimis spithamæis summo excepto griseis, arctis striatis, e maxima parte vestitus, summis in bracteis gradatim abeuntibus.

Racemus scapi apicem terminans brevis, vix vigintiflorus, flexuosus luteo-viridis vel luteus.

Bracteæ ovatæ lanceolatæve, herbaceæ venosæ ovariis duplo fere breviores.

Flores antici nutantes, mediocres inodori, diametro transverso vix uncialis, longitudinali 8-lineas metiente alabastris ascendentibus. Perianth. ringens extus læte luteum lucidumque intus albidum venosum.

Sepalum posticum æquilateraliter obovato-oblongum, lateralia linearia oblonga, basi paullulum obsoleta, omnia breviter mucronata, obsolete carinata, basi viridia.

Pet. directione eadem obovata lateora, longitudine æqualia. (Assam name *Oooloo Fool.*) Labellum cum basi columnæ continuum, columnæ parallelum calcaratum, calcare læve conico albido apice viridescente.

Cucullatum, 3-lobum, lobis lateralibus rotundatis purpureofuscis minutissimeque punctulatis, terminali rotundato crispato integerrimo medio callo obovato rugoso aureo insignat: basi purpureo-fuscum cæterum lutescens marginalibus imis purpureo fuscis et eodem colore irregulariter striatum.

Cristæ septenæ albæ e basi calcaris ortæ lateralibus brevibus incompletis, centrali basi excepta obsoleta, intermedius sape confluentibus ad callum. currentibus et ibidem rugarum formationem terminantibus.

Columna mediocris, semiteres deorsum leviter arcuata alba apice viride pallidissima tincta antice qua plana carneo et minutissime punctulata.

Clinandrium superficial, margine postico elevatione minute repando dente affingente brevi interno.

Stigma cucullatum. Rostellum deflexum acuto bipartitum utrinque denticulo auctum.

Anthera terminalis mobilis decidua rotundata, diametro transverso majore, antico in processum linguiforme rostello parelletum membranaceum continuata, bilocularis, loculis globosis, septis his nullis.

Pollinia 2, cerea globosa inferne et caudicularum. insertionem prope profunde foveolata.

Caudiculæ partiales elasticissime situ naturali breves; detractu longissimæ. Caud. (*communis,*) linearis lata, membranacea apice dilatata et extrorsum flexa.

Glandula 3-angularis, submembranacea. Ovaria glabra læte viridia, lucida pedicellos brevissimos ali-quoties excedentia.

Hab. Assam in campis graminosis *Suddyah* circa: *June,* 1836.

Vanda.

1. *Vanda cœrulescens* Gr. Pl. CCCXXXI.

Pedunculus albido-cærulescens basi atro-cæruleus. Perianthium pallide cærulescens. Pet. basi semel torta.

Labelli trilobi, lobis lateralibus intus purpureo-lilacinis, lobo medio basi albo, apicem versus cæruleo. Calcare purpurascente.

Columna semiteres cærulea minute punctata. Anthera bilocularis, dorso leviter cristata. Pollinia 2, postica fissa glandula fuscescens.

Hab. Epiphytica in arboribus Tsenbo near Bamo in Burma.

Obs. Vix Vandæ species ob labelli lobos lateral. columnæ adnatos etc.

Bhamo: April 26th, 1837.

2. *Vandea teres.*

Caules virides, vaginis foliorum omnino tecti. Folia teretia obtusa, hinc (interne) sulcata in vaginis articulata, vaginæque arctæ sæpe rubro-punctatæ.

Racemi? axillares per basin vaginarum erumpentes, hinc illinc squamis fuscis membranaceis brevibus amplexicaulibus aucti pauciflori, parte florifera flexuosi.

Flores magna speciosi inodori, subsessiles, ovarium acute angulatum albidum.

Sep. posticum obovatum, repandum erectum. lateralia majis obovata, quasi unguiculata.

Labello supposita basibus inter se coalita. Perianth. albida basi gamosepalum!

Pet. rotundata repanda, albida purpureo-tincta, labello subparallela.

Labellum obsolete venosum cum columnæ basi attenuatior producta contin. calcaratum, calcare conico obtuso recto compresso, 3-lobum, lobis lateralibus cucullatis insuper columnam

truncato-rotundatis, terminali porrecto, cuneato obovato bilobo.

Color loborum apicem carneus cæterum luteo-fuscum, lobo lateralibus purpureo oblique breviterque lineatis, medio parce purpureo punctato et papulosum etc ut calcaris medium.

Columna semiteres alba, basi attenuatim producta, antice rubro pallida, minutissimeque punctulatum.

Clinandrium parum profundum margine subintegro medio elevatum.

Anthera, medio postice obtuse cristata, antice in processum plano subulatum in rostello incumbentia acuminatum, obsolete bilocularis, loculorum parietibus posticis membranaceis fuscis. Rostellum latum declinatum emarginatum. Stigma apicale magnum valde profundum.

Pollinia 2, cerea rotundata depressa hinc lateri exteriori apicem versus breviter fissa, mediante disco brevi in caudiculam latam linearem membranaceum, apice affixa.

Glandula triangularis latissima viscosa.

HAB. *Suddyah:* in arboribus.

Vanda teres Lindl. Orchid. 217.

Vix generis species legitima ob perianth. basi connatum, sepalis lateralibus, labello suppositis, et columnæ basin attenuatam productam.

3. *Vanda Lindlayana* Gr.

Pendula, caulescens, caule vaginis foliorum omnino tecto. Foliis loratis basi latis subrepandis coriaceis crassissimis, oblique emarginatis, 1-nerviis, 2 pedalibus, subglaucescent.

Spicis axillaribus, pedalibus vel ultra pendulis, flexuosis viridescent. Bracteis rotundatis membranaceis, ad basin cujusque ovarii.

Floribus, quoad axis posticus magnis diamet. 2 unciali. Per. explanatum coriaceo-carnosum. Sepala obovata subæqualia, extus brunneo-purpurascentia, marginibus lutiscentia, intus luteis, maculis amplis irregularibus quorum mar-

gines saturationes fuscis. Pet. conformia minora, coloris paginæ interioris sepalorum.

Labell. lutescens minimum quoad perianth. obtuse sagittatum deorsum arcuatum, cum columnæ continuum. lobis basilaribus fusco-tinctis rotundatis, terminali carnoso, lineis magis 3, anticis notatis subclavatis, processus dentiformis in medio limbo albus.

Columna nana, semiteres utrinque gibbifera. (Anther rudiment. lateral.) Stigma magna, totam frontam columnæ occupans.

Pollinia 4 incumbentia per paria, lutescente, caudicula alba complanata.

Glandula membrana expansa.

Labellum basi bicallosa. Stamina sterilia 2 inter pet sepalaque lateralia. Anth. 1-locularis. Columna basi antice emarginata.

Hab. In Lagerstrœmia Reginæ epiphyte, ad ripas flum. Tenasserim prope *Barlavo: February*, 1835.

A magnificent plant, the only one I have hitherto seen capable of rivalling America Vandeæ, *Mergue Herb.* 1054, and 1082.

4. *Vanda bicolor.* Pl. CCCXXX.

Itinerary Notes p. 132, no. 546.

Dipodium.

Dipodium Khasyanum Pl. CCCXXVII. Fig. II.

Itinerary Notes p. 84, no. 1219.

Saccolabium.

1. *Saccolabium carinatum* Gr.

Caulescens, caule repente ramis ascendentibus.

Foliis distichis coriaceis canaliculatis deorsum arcuatis,

apice obliquis, vel sæpius integris, (æqualibus) carina prolonged into a dagger.

Racemis foliis multo brevioribus corymbiformibus vagis, vel axillaribus vel opposito-axillaribus vel supra axillam, axi clavata viridia.

Flores plures, rather small postica (non resupinata. Pedicello basi 1-bracteata minute.

Per explanatum laciniis intus arcuato-fornicatis extus lutescente viride, intus lutescens, with incomplete, or complete bars of sanguineo-fuscous colour. Sepala inæqualia spathulato-obovata, laterali obliquis majoribus.

Petal sepalo antico similibus sed minoribus.

Labellum cum columnæ basi accret. calcare infundibulif. ½ length of the pedicel or thereabouts, fauce calcaris carnoso, intus villis transversis, shut up, *the margins of the faux meeting over the base of the lamina.* Labelli lamina alba oblongo-cordata vel basi lunata oblonga processubus transversis carnosis lamelliformibus irregularibus omnino tectis at least the upper surface.

Columna teres nana sanguineo rubra clinandrio (shallow,) secus centrum carinata, dente postico obsoleto, lateralibus majusculis obtusis. Anthera terminalis (like a jockey's cap,) incomplete bilocularis.

Caudicula longa. Glandula oblonga carnosa.

Fructibus oblongo-clavatis, apice nudis, costis obsoletis.

Pollinia 4-posteriora minora.

HAB. Serampore in the vicinity of Calcutta on Mango Trees.

It appears to be allied to S. *acutifolia* and *calceolare*. *November* 22*nd*, 1841.

S. *carinatum.* Rostellum bifissum, lacinium crure utroque apice sursum product in setulam utrinque glandulæ applicata.

Fructus oblongo clavatis-apice nudis, costis obsoletis.

2. *Saccolabium calceolare*, Lind. Pl. CCCXXXIV.

Epiphytica in arboribus. Fol. petiolis omnino vaginantibus, oblongo-spathulatis, apice obliquis tri-bidentatis, dentibus nempe partis longioris geminatis! subulatis, carnosis, coriaceis 1-veniis.

Racemis umbelliformibus, pseudo extra axillaribus, articulatis? bracteis 2-3 annulatis, membranaceis sphacelatis. Pedunculo clavato, floribus pedicellatis pedicello basi breve bracteato posticis sepala petalaque, lutescentia, castaneo crebre maculato maculis confluentibus.

Flores postici. Per. explanatum carnosum. Sepala obovata petal eadem consistentia, spathulata, labellum cum basi columnæ continuum saccatum, sacco globoso, limbo transverso 3-angulari, papilloso, subfimbriato.

Labellum album, saccatum, saccæ fundo luteo, guttato coccineo colore, marginibus saccæ rosaceis, limbo maculis rosaceis paucis, medio luteo maculis rosaceis, crebreoribus. Columna fusco rubra.

Columna nana simplex. Rostello bifido anthera terminalis bilocularis.

Clinandrium a medio processum dentiforme elevatum antheram affingentem gerens.

Pollinia 2 globosa, inferne foveolata caudiculam spathulato-linearem subsessilia.

Glandula oblonga apice emarginata. Rostelli dentes basi denticulatæ.

HAB. Khasyah and Bootan mountains, Khasyah Herb. 151.

Churra Moosmai: in Sylvis. *Oct.* 16*th*, 1835. See also Itinerary Notes p. 170, no. 869.—A beautiful species.

3. *Saccolabium*, Pl. CCCXXXIII.

Itinerary Notes p. 46, no. 713.

4. *Saccolabii sp.*

Epiphytica in arbor. Caulibus brevibus vaginis folior. vestit. fol. basi ½ torta lineari-lanceolata, apice obliqua bidentata, dente dimidii longioris basi denticulata, etiam geminata, carnosissime carinata apices versus 3-angularia denticulataque.

Racemis subumbellatis pseudo extra axillaribus brevissimis, bracteis annulatis 2-3 membranaceis donat. Bracteolæ pedicellis multoties breviores, flores postici duplominores quam in præcedente, petala sepalaque subæqualia pallide lutescentia, a medio supra sanguineo guttata.

Labellum calcar subincurvum rotundatum sacciforme marginibus saccæ magis elevatæ purpurascentes *antice.* Lamina lunulato deltoidea, fimbriata medio convexior sulcata, lutescens maculis purpureis, fimbriis albis.

Columna nana lutescente purpurea. Rostellum bifidum dentibus basi denticulatis, caudicula lineari-spathulata. Glandula apice connica postice quoad stigma bifida. Pollinia 2 globosa, inferne foveolat.

Species intermedia inter S. calceolare et obliquum. Lindl. Orch. 222. In Sylvis, *Moosmai* : *October* 15*th*, 1835. Khasyah Herb. 152.

CLEISTOMA.

Cleistomæ sp.

Statura robust. Caulescens, folia vaginæ subuncialis, lamina reflexa patens, basi conduplicato, canaliculata cæterum plana, 1-venia ½ subundulata subæqualiter emarginata, cuspide breve interjecto lutescente viridia carnoso coriacea, dodrantalia.

Paniculæ 1½ pedalis e basi vaginæ erumpens, on the same plane as the lamina and consequently truly axillary.

Rami simplices vel compositi. Flores spicati minuti, bracteam minuta squamiform suffulti. Ovar. robustum, acute 6-angulatum ratione floris magnum, (but only after fecundation which appears universal,) giving the plant a conspicuous

aspect lutescentes with fuscous margins; the petals and sepals are non resupinate.

Perianth. carnosum subconnivens. Sep. oblongo spathulata subæqualia apicibus versus incurva. Pet. angustiora et paullo longiora.

Labellum quarum maxime saccatum margin of mouth outwardly deficient, interjecto lobo (tertio) centrali cordiformum reflexo, opposite to this, inserted about middle of back of the sac, is a whitish, subparallelogramic lamina, upper end truncately denticulate, and placed on a level with the base of the terminal lobe of the labellum.

Columna nana carnosa apice quarum truncato et obsolete angulata, the whole of the posticous face occupied by the stigma. Anth. terminalis membranacea bilocularis. Caudicula long, forming a small angle with the column.

Pollinia 2 sphærica vel potius 4 posteriora minora in una sphærica quasi coalita. Glandula oblonga, caudicle attached to it near its lower end, so that the gland looks as if retrofract.

Rostell. crura parallel to column and connivent.

HAB. Malacca, Kamooning in arboribus scandens. It is apparently a species of Cleistoma, but why that is separated from Saccolabum and Sarcanthus I cannot imagine.

APPENDICULA.

1. *Appendicula stipulata* Gr. Pl. CCCXXXV.

1. Alabastrum and bractea of spike.
2. Flowers expanded, what is brown should be yellowish, but the flower was *un peu passé*.
3. The same, one lateral sepal and one petal removed.
4. Of an alabastrum sepals removed.
5. The same petals removed, *a a* auricles of column, *b* rostellum and gland.
6. The same, labellum displaced a little.

7. Labellum in front (upper half) to shew the lobes and callus of inter-lobe spaces.
8. Column and labellum of no. 2, labellum a little displaced.

Pl. CCCXXXV. Fig. I.

1. Ovarium and column seen dorsally.
2. The same seen laterally, the anther forcibly displaced exposing the Pollinia.
3. Anther inner face.
4. Pollinia laterally. } Not separable from the *gland* from
5. Do. upper face. } immaturity.
6. Front view of column, part of anther seen at *a a*, *b b*, auriculæ with the inner cariniform prominence, *c* stigmatic tissue.
7. Lateral view of column, anther removed.
8. Dorsal view of do. anther removed.

HAB. Affganisthan.

2. *Appendicula teres* Gr. Pl. CCCXXXII.

Epiphytica cæspitosa. Caulibus simplicissimis cylindraceis lævibus, basi squamarum scariosarum vestitis; junioribus valde abbreviatis squamis scariosis imbricatis acuminatis vestitis, apice folium unicum tereto-subulatum, interne sulcatum acutiusculum gerentibus. Petiolo brevissimo sinu flores protegente, in caulibus junioribus bracteam ovatam acuminatam amplectentibus.

Folia demum decidua, vagina inflorescentiaque nempe paleæ pedicellæ erumque bracteæ persistentes dentius postremo decidua, unoque caulis apice circumscissus videtur.

Flores capitati, terminalis e sinu vaginæ erumpentes bracte scariosa suffulta, parvi inconspicui aspectu Fumarioideo. Pedicelli pubescentes filiformes basi apiceque bractea vaginante scariosam acutam inflatum gerentes, bractea extimæ vacuæ lanceolatæ.

Per. anticum tubulosum. Sepala oblonga, apicibus reflexa postico obtuso, lateralia acuminata, inter se et cum pede columnæ elongatæ parum curvatæ in calcar obtusum breve pubescente connata. Per. tubulosum, extus pubescens.

Pet. ovata acuminata, apices versus reflexa.

Labellum integerrimum lingulatum unguicullatum, cum pede columnæ continuum? spathulatum carnosum obtusum, facie interiori planiusculum, albidum, apice qua valde carnosum aurantiaceum.

Columna semiteres basi in pedem apice angustatum producta, apice productis columna antica in processubus 2 concavis oblongis producta, pede longe producto.

Clinandrium profunde excavatum, parietibus membranaceis, parieto postico altiuscule cum processus columnæ margine postico confluente, antico altiore, medio emarginatum.

Rostellum conicum obsoletum in sinu parietis clinandrium antica situm.

Anthera terminalis mobilis bilocularis dente obsoleta clinandrii marginis postici affixa, loculis obsolete 4-locellatis, connectivo carnoso rugosulo.

Pollinia 8-obovato pyriformia, subcerea, albida, in glandulam diaphanam ovatam, attenuata,caudicula vera nullam, stigma inter bases processus columnæ reconditum.

Pollinia 8 in glandulam attenuata.

Planta epiphytica, cæspitosa, caulibus teretibus basin squamatis, apice 1-foliosis. Fol. tereto subulata. Flores capitati. (Pedicelli bracteato basi apiceque paleis.)

HAB. Upper Assam. Versus, *Negrigam*: *Januarg 19th*, 1836.

Genus distinctum, Appendiculæ (Blumii) forsan affine.

3. *Appendicula Lewisii*, Pl. CCCXXXVII.

Caulis spithamæus vel subpedalis, anceps. Folia bifaria fere perpendicularia leviter curvata, angusto-lanceolata inæqualiter bifide univenia pallide viridia.

Racemi pauciflori axillis oppositifoliis breviores, subcernuim pauciflori.

Bractea membranacea anguste, ped. et ovarium subæquans.

Flores minutiss. resupinatos albidos.

Capsula pallide brunnea, oblonga tricostata.

Per. connivens, memb. cellulosum.

Sepala oblonga, subacuta, lateralia valde basi obliqua et cum columnæ basi producta, cunnata.

Pet. conformia paullo minora.

Labellum, sacco magno rotundato, intus *semi-cyathifero*, cum columnæ basi continuum, lamina integra ovato-cordata, lateralibus subreflexis, acumine erecto.

Columna basi longe producta, nana sursum purpureo-fusca.

Stigmatis fissura antice integra sigmoideo-flexa, postica linguiformes, longe producta oblique inclinata, apice glandulifer emarginata, glandula amplectente.

Clinand. excavat. profundum, dente affigente magno introflexo. Glandule opaca oblonga. Anth. ovata sagittata, membranacea immersa, inclinata in stigmatis, labio postico incumbens, bilocularis, antice 3-dentata.

Pollinia (8-4 per) attenuata clavata, inferior longiora, cerea, caudicula 0.

Hab. Penang. It flowered here (*H. B. C.*) *March*, 1843., the same month it arrived from Penang, from whence it was sent by Mr. Lewis.

Obs. Flos et habitus Sarcanthorum, columna staminque Neotticarum.

The stigmata discharges or pressure nucleare cellules and raphides.

It is evidently the Neotticous form of Vandeæ, I never before saw such a Vandeous plant, the stigma distinctly *terminal* and immediately under the rostellum is quite Neotticous, so is the shape of the stamen, and of the pollinia.

The habit is that of Sarcanthus and so is the flower, including the labellum.

The appendage is remarkably attached to the labellum inside about the middle, the parting back forming ½ a saucer.

1. Flower laterally.
2. Do. one lateral sepal removed, I *think* it is not adherent to the labellum.
3. Petals and sepals removed.
4. Column and labellum in front, the labellum deflexed.
5. Long section of labellum.
6. Upper end of column lateral.
7. Same dorsal.
8. Dorsal of an anther, just like an insect's head.
9. Under do.
10. Pollinia laterally.
11. Column, lateral, anther removed.
12. Ditto dorsal.
13. Do. ventrical shewing loose cells in *gorge*.
14. Loose conducting cells, and raphides.

The flowers seen were imperfect, though expanded, the pollinia had not become united to the gland.

SARCANTHUS.

1. *Sarcanthus secundus* Gr. Pl. CCCXXXVI.

Epiphyta in arboribus; caulis compressiusculis, vaginis, quorum infimæ albido-brunneæ striatæ, omnino obtectis, pedalis vel sesquipedalis, inferne radicans.

Folia secunda, linearia, *carnoso*-coriacea, integerrima, utrinque sed præsertim apice attenuata, apice basi constrictiusculo ambitu dente 3-gono, apice basin subæquante tereto subulato, longitudine spithamæa, latitudine sub 4-linealia.

Spicæ directione fere foliorum, his breviora, oppositifolia, vere axillaria, sursum paullo incrassata, basi fuscescentes, squamis vaginantibus paucis tecte, cæterum albida angulata, aspectu pruinoso.

Bractea minutissima squamiformea, florem quemque fulciens.

Flores postici mediocres inconspicui patente deflexi, post anthesin deflexi, clauseque inodori.

Per. explanatum pallide lutescens folioloque intra margines linea lata aurantiaceo-rubra notatâ *fasciata*.

Sepala obovato-spathulata, lateralia reflexiuscula antica paullo majora fornicato-libera basi æqualia.

Pet conformia paullo minora.

Labellum cum columnæ basi connatum. Calcare subconico, obsolete decurvo leviter emarginato, laminam paullo excedente; lamina 3-loba, lobis lateralibus rotundatis concavis apiculatis, terminali saccato, breviter linguiformi carnoso, extus paullo infra apicem lamina brevissima truncatum gerens.

Calcaris bilocularis faux clause callis duobus, quorum superum brevem patelliforme inferum oblongam septum terminans.

Color albus, lobis lateralibus supra lutescentibus, infra purpureis tinctis, terminali, primum albo, demum septum calcaris inferne completum, superne incompletum.

Columna brevis alba semiteres subinteger marginibus apicis antice incrassatis, fere gibbosis.

Stigmato obovato margine inferiora truncato fere omnino nuncupato.

Anthera cum columnæ angulum fere rectum formans, membranacea, antice longe acuminata bilocularis, loculorum parietibus inferis demum verticalibus.

Pollinia 4 incumbentia, inferiora minora, subhæmisphærica, faciebus contiguis convexiuscula pallidissime lutescentia.

Caudicula longissime spathulata canaliculata hyalina. Glandula parva directione verticali carnosa ovata.

Clinandrium parum profudum. Rostellum leviter deflexum carnosum centro sulcatum breviter emarginatum.

Capsula (immatura) 3-costata, costæ planæ, sepalis oppositæ, glabra.

HAB. *Suddyah:* in arboribus, *August* 1836.

Sarcanthus foliis secundis, linearibus apicibus tereto-subulatis. Spica simplici folius breviore, sepalis petalisque obovato-spathulatis, labelli calcare e lamellatam,

1. Flower viewed vertically 10 diameters.
2. Do. laterally 8 diameters.
3, Lateral view of labellum and column and anther.
4. Longitudinal section of Labellum obliquely through the column and ovarium.
5. Transverse section of the Spur towards its base.
6. Vertical view of the dorsum of the anther.
7. Do. of ventral.
8. Lateral view of the column and pollinia in situ.
9. Pollinia seen anteriorly.
10. Ditto seen laterally. 11. Ditto posteriorly.
12. Apex of caudicula and gland.
13. Front view of column.

2. *Sarcanthus guttatus,* Lindl.

Epiphytia in Fici sp. pendula, caulibus brevibus, foliis subsecundis, loratis oblique emarginatis. Racemis axillaribus densifloris, fol. excedentis, floribus majusculis *posticis* carneis, maculis variis rosaceis, suaviter odoratis.

Per. explanatum. Sep. æqual. obovat. Pet. cuneato-obovata.

Labell. posticum basi cucullatum calcaratum, calcare curvato obtuso potius unguiculato, ungue curvato calcariformo, limbo cordato, crenato denticulato, calcare brevi ad basin limbo, columna marginibus involutis.

Rostello longo fissa antice foveolata. Anth. bilocularis antice productis.

Pollinia 2 rotunda caudicula longiss. glandula oblonga, peltata.

HAB. *Tennasserim provinces*: *April* 24*th*, 1835.

Aerides.

1. *Aerides carnosum* Gr. Pl. CCCXXXVIII. A.

Itinerary Notes p. 182, no. 934.

1. Flower seen vertically.
2. Ditto ditto laterally.
3. Longitudinal section through the column and labellum.
4. Pollinia seen in front.
5. Ditto ditto back.
6. Ditto ditto with the upper portion of the caudicle, the masses being displaced to shew their attachment. Back view.

Hab. Bootan. Videtur prox. *Aerides tæricale,* Lind. Orchid. 239.

2. *Aerides decumbens* Gr. Pl. CCCXX.

Fig. 1. Plant natural size.
c. Pollinia spread out front view.
d. Ditto in situ front view.
e. Ditto in situ posterior view.
f. Ditto lateral view.

Hab. Burma in arboribus sylvis versus *Mogoung* : *April,* 1837.

Calanthe.

1. *Calanthe odora,* Gr.

Racemi *radicales* sesquipedales precocia quoad folia, bracteata, bracteis foliaceis lineato lanceolatis, floriferis, ovaria subæquantibus.

Flores magni albi speciosi. Pedicelli ovarique pubescentia alba.

Sepala ovata vel oblongo-ovata mucronata marginibus apice incurvis, sub 3-venia.

Petala eadem longitudine, eodem more mucronata spathulato-lanceolata, duplo angustiora sepalis, 3-venia, venis approximatis.

Labellum cum columnæ facie antica, secus margines adnatam, basi in calcar teres, apice inæqualiter bilobum, ovarium $\frac{1}{3}$ excedens, product. Lamina-3 loba, lobis lateralibus oblique oblongis, terminali late profundeque obcordato, album vel cream coloured. Appendicula laminæ basi inverse obovata e processubus carnosis sæpius lobatis erectis luteis, vel basilaribus $\frac{1}{2}$ albus. Labium crystallino-cellulosum nitens.

Columna nana semiteres antica product in processubus oblongis, intus concavis, secus margines inferiores cum labello connatis apicibus imis liberis.

Clinandrii margo posticus rotundatus et subinflexus. Rostelli processus 2, linguiformes deflexi. Stigma antica maxime viscosum, fundos concavitatum processuum columnæ etiam occupans.

Anthera terminalis mobilis. intus marginem clinandrium posticum affixa, connectivum suborbiculare carnosum. Loculi profunde membranaceis obsolete 4-locellata, septis transversis valde incompletis, imo obsoletis.

Pollinia 8 obovata, ope caudicularum totidem pulverearum affixa glandulæ stigmatis linearis viscosæ hyalinæ?

Folia juniora convoluta, lanceolata plicata subtus subglauca, odore florum similis odori hyacinthi non scripti.

Hab. Upper Assam in graminosis, *Suddyah*: *April* 10*th*, 1836. Assam Herb. 477.

Obs. Flores odoratissimi, labellum basi fragile. Glandula vix cartilaginea. Calcar extus intusque pubescens, ut etiam partis facies interior columnæ adnata. Bracteæ infimæ sterilis vaginantis. Calcar labellum subæquans.

Calanthe Scapo erecto, racemo densiflora, præcoci, ovariis pedicellisque pubescentibus petalis sepalis duplo angustioribus. Labello 4-lobo, basi tuberculato obsolete sulcato, calcare

filiformia labelli subæquanti, apice bidentato. Pars. lacera cito cæruleo cit.

Genus Bletiæ certe affinis, obque hanc Sectiones Lindleyanæ. arbitrariæ videntur.

2. *Calanthe gracilis Lind.*

Per. explanatum. Sepala æqualia lanceolato-oblonga acuminata fusco-lutea recurva, 1-nervia, extus pubescentia, intus subglabra. Pet. conformia sed paullo angustiore recurva breviora acuto luteo aurea, margines versus sub 3-nerva intus pubescentia extus glabra !

Labellum cum basi columnæ articulatum, sessile oblongum, sub-cucullatum, 3-lobum, lobus lateralibus oblongis apicibus recurvatis et medio aureis marginibus albido lutescente, terminali basi versus præcipue velutino, et oblongo quadrato lamina dilatata, subreniformia sinuato crispata, albida. Cristæ 2, parum distinctæ, rectæ basi laminæ, lobi terminalis versus desinunt. Labellum basi aureum.

Column velutino pubescens nana, antice gibbosa et cum basi columnæ quasi saccum formans, vel marginibus antice productis, apice subtruncato, dente postica minima. Clinandrium oblique profundiusculum.

Rostellum membranaceum acutum, Stigma quasi terminali.

Alabastra acuminata lanceolato-ovata, supra *extrorsum* convexa, introse subventricosa.

Anthera semi-immersa, membranacea, bilocularis. loculis obsoleta 4-locellatis.

Pollinia 8-obovata hinc complanata per paria, collateralia, et quaternatim caudiculis totidem apice corpus glandulosum viscosum, glandulam referente, gerentibus affixa, candicula glandula versus in 2 coalitæ. Pollinia majora, antica.

Certi non Bletia. Potius Calanthe, si Calanthe, genus certe dividendum. An C. gracilis Lindl. Orch, 251, ? glandula minime evoluta, caudiculi 4-fidæ, bifidæ basi indivisæ.

3. *Calanthe plantaginea* Gr. Pl. CCCXXXIX.A.

Itinerary Notes p. 174, no. 891.

1. Flower.
2. Column and labellum seen in front.
3. Ditto ditto anther removed.
4. Column and labellum seen laterally.
5. Longitudinal section of ditto.
6. Anther seen in front.
7. Ditto section between the loculi one of the parietes or ½ of the inner paries reflexed.
8. Pollinia seen in front.
9. Ditto ditto laterally.
10. Ditto back view.

HAB. Punnukka Bootan: *April,* 1838.

ORCHIS.

Orchis uniflora Roxb.

Herba 3-4 uncialis, cæspitosa in rupibus madidis umbrosis proveniens. Rhizomatis filiformibus repentibus. Caule bifolio, foliis linearibus, acuminatis teneris sub 5-nerviis. Pedunculo terminali filiformi, folia fere duplo breviore, apice bracteà ovato-carinata acuminata, ventricosa stipata ovario breviore, flore unico magno, albo.

Sepala lanceolata acuta, carinata. Pet. ovalia, multo majora, a medium snpra reflexa. Labellum planum consitentiæ perianthium cuneato-obcordatum medio apice bidentatum, calcare subulato incurvo acutiusculo limbum 2½ superante. Columna subplana, oblonga obtusa antice bicornis, cornubus ascendentibus, stigma labioforme, carnosa cordato-lanceolata supra viscosum.

Anthera dorsalis emarginata bilocularis, loculis antice productis in processubus subulatis membranaceis, cavis sulco cornium stigmatis applicitis. Pollinia 2-lobulata, caudiculæ

longissimæ in processubus, antheræ ascendentis obtectæ, glandula carnosa, rotundato lateraliter intusque affixa.

HAB. Khasyah mountains Secus aquam *Moosmai*: *Oct. 15th*, 1835. Assam Herbaria no. 147.

Orchis (Habenaria) uniflora Pl. CCCXXXVIII. Fig. II.

1. Flower and Plant natural size.
2. Ditto sepals removed rather enlarged.
3. Column and base of Labellum.
4. Front view of ditto.
5. Ditto Lateral view one wall of the anther bent back at *a*.
6, Ditto cut through the centre.
9. Pollen mass.

Churra Ponjee: *October 16th*, 1835.

HABENARIA.

1. *Habenaria tenuis* Gr. Pl. CCCXLII.

Pedalis, vel sesquipedalis; fol. conferta caulis basin versus unico intermedio inter fol. et bracteas lanceolato-acuminatas, fere Plantaginis lanceolatæ extima lanceolato-oblonga planiuscula patente, interiora oblongo-linearia canaliculata, erecta, intima conduplicata.

Spica elongata multiflora, floribus sparsis e luteo-viridibus, bracteas ovaria semibrevioribus. Ovarium arcuatum erostratum.

Sepalo viride postico subcordato, 3-venio lateralibus oblongis reflexis, marginibus demum revolutis.

Petalis luteo-viridis obliquisculis, sepalo postico suppositis, longioribus.

Calcar. ovar. ½ longius, filiform. apice subulato intus arcuat.

Labell. luteo-virid. tridactylum, lobo medio pendulo, lateralibus patentissimis, subfalcatis paullulum longioribus.

Columna brevis parum obliqua. Stigmatis superioris crura carnosa, brevia planiuscula.

Stigmatib. lateral. sublinguiform, projecting and closing the mouth of the spur, and adhering to the base of the lip.

Pollinia granulis maximis, caudicula brevis, reclining laxly on the arms of the upper stigma, glandulis nudis maximis carnosis.

Anthera basi vix elongata caudiculæ breves proni in cruribus rostelli planiusculis margine exteriori subinvoluto.

Glandula maxima, subtrigona facie postia subconcava alba viscossissima.

Ovarium basi tantum tortum.

Columna glandulæque Herminii, perianthio calcareque, Habenariæ, ab utroque discrepat ? staminodius parum evolutis.

It does not appear to agree with any species in Lindley, but it approximates to H. promensis p. 320.

The specific character may be stated as follows, chiefly in contrast with Lindley's characters.

Habenaria. foliis basilaribus pluribus, exterioribus planus oblongis, interiorib. oblongo-linearib. erectis canaliculatis vel conduplicatis, spica *laxa,* multiflora. Bracteis acuminatis ovario ½ brevior. Sepalis lateralibus reflexis marginis involutis.

Labelli carnosi trilobi, lobis subæqualibus, lobis lateral sursum et intus arcuatis, medio pendulo. Calcare ovario ½ longiore arcuato, filiformi-subulato.

HAB. Serampore, Bengaliæ inferioris. Pedalis gracilis striata folia fere Plantago lanceolatæ. Labelli lobi utrinque convexi obtusi.

Processus carnosus, magnus prominulus.

1. Plant natural size, upper end of spike separately drawn.
2. Flower front view.
3. Ditto lateral view, sepals removed.
4. Genitalia front, and base of the labellum.
5. Ditto seen laterally.
6. Ditto front. Pollen masses etc. removed.
7. Pollen mass caudicula and gland.
8. Transverse section of the ovarium.

2. *Habenaria marginata* Pl. CCCXLI.

Folia 3-4 ad basin approximata.

Racemus terminalis plurifloris, floribus lutea viridibus.

Perianthium galeatum.

Sepalo postico (resupinate) cordato ovato 5-venia, 3-5 carinata.

Sepalis lateralibus quasi petiolatis, petiolo cum labelli parte inferiore connato, lamina lanceolata porrecto-patente, planiuscula, 3-5 venia.

Pet. lateral. sepalo postico arcte supposita obliqua, broadly subscimetar shaped.

Labellum porrectum cum columna continuum, calcare longiusculo clavato curvato, 1-locul intus pilosum, profunde 3-lobum, lobis lateralibus centrale duplo fere longioribus lineari-subulatis, centrale conduplicata et tunc linguiformis.

Columna nana.

Anth. suberecta, connectivo hippocrepididformi, loculis distantibus, secus marginem dehiscentiæ ob marginem connectiva supero decurrente subcristat.

Pollinia 2, sectilia, caudicul. rostell. cruribus applicitæ.

Glandula the dilated concava apex of caudicula.

Stigmata magna, postico bicruralis, lobulo interjecto, cruribus longis conniventibus, apice truncatis subemarginatis, lateralibus brevioribus, adnate to the floor of the labellum, apice truncatis rotundatis.

Staminoidia petaloidea, lineari-lanceolata, columna superantia.

HAB. About Serampore here and there, not common.

Char. Radices testiculatæ ?

Folia 3-4 ad basin caulis in humo patente ovato-oblonga, 3-5 venia, cellulosa, margine membranaceo conspicuo albo.

Sursum subito in fol. floral bracteisque angustat.

Bracteis subcarinatis lanceolatis acuminatissimis ovariis ½ longior, virides. Spica 7, 12 flora.

Pl. CCCXLI. Fig. I.

Plant natural size and parts of the flower.

Pl. CCCXLI. Fig. II.

1*a a*, sepals, *b* lateral petal, *c* staminoidea, *d* anther, *e* crura, *f* rostella, *g* lateral stigmata.

2. The same letters have the same references, *i* inferior surface of the stigmatic canal, *k* orifice of the spur, *h* base of labellum.

3*a*, posticous stigma, *b* staminoidea, *c* gland not separable, *d* lateral stigma.

4*a*, posticous sepal, *b* base of lateral petal, *c* base of lamina of lateral sepal, *d* staminoidea, *e* anther, *d* its crus, *f* crus of rostellum, to which the crus of the anther *d*, is applied.

Obs. It is *H. marginata* Colebrooke, in Hook Ex. Flora t. 136, indifferent.

It has the structure of Habenaria commelinifolia,

The generic descriptions appear unintelligible, particularly as regards the rostellum.

From Lindley's characters it would appear to approximate to *Ate* or *Cynorchis*, from the last it only differs in its herbaceous flower judging from the figure.

Nothing can be more distinct than the three stigmata, the posticous one is the most developed, and describes more than a semicircle, it is bipartite, while the lateral ones are simple.

Hence the 2 stamina corresponding to the two lateral sepals, and that corresponding to the labellum are wanting.

Lindley's character gives Cynorchis with sepals connivent, compare this with the Fig. of Cynorchis fastigiata Bot. Reg. new series t. 1998 : in which the lateral sepals are at least ½ patent.

My idea of a connivent Orchideous perianth is such as occurs in Neottia.

Serampore: August 18*th*, 1841.

3. *Habenaria commelinifolia* Pl. CCCXXXIX.

1.(A.) Bud of Habenaria commelinifolia.

2. Lateral view of column, labellum removed all but the spur.
3. Front view staminodia caudiculigerous processes of upper stigma, 2 lateral view of the stigmata, shewing also a tendency to form processes under these belonging to the inside of the spur.
4. Anther transverse section, the septa towards the well marked line of dehiscence, become less evident, but the anther is now 4-locular.
5. Lateral view of column and labellum.
6. Do. labellum mostly removed as also barren stamen, the legs of the anther somewhat lifted up from the grooved rostellar processes, and their ends separated by force from the gland, which adheres to the rostellary processes. This shews that of all the caudicule, very little indeed of it is stigmatic.
7. Long central section of a more advanced bud shewing the rostellum, and 1-lateral stigma, it is curious that from the process of the base of spur an annulus exactly like the stigmatic tissue is formed, it may be really stigmatic as it adheres to the lateral stigmata.
8. Bud fully developed, natural size.

8*a* Column and labellum of do. 10 times magnified.

9. Column in front, the anthers are open, the long line of dehiscence, only terminating within a short distance of the gland is shewn, *a* opening of stigmatic canal, *b* processes of inside of the spur.

1. (B.) Same series as 1 to 6, of fig. A., but intended to show that the crura of the antheræ are quite distinct from those of the rostellum $\frac{1}{15}$ times.
2. Section of column of 8; *a* rostellum, *b* crus grooved along the upper edge, which received the crus of the anther, *c* gland, *d* anther and its crus, *e* pollen mass, the caudicula is round only towards the gland, and here it is more white, elsewhere it is yellowish, and has a differ-

ent section, *f* lateral stigma, *g* process of calcar, and its annulus, exactly looks like stigmatic tissue, and is like the annulus, formed by the lateral stigmata.

3. Gland, and extremity of the caudicula,

Herminium.

Herminii sp. Pl. CCCXXXVIII. Fig. I.
Itinerary Notes p. 58, no. 900.

Pterigodium.

Pterigodii sp.—Herba pedalis terrestris erecta simplex.

Fol. perfectum-medium versus axeos tantum adslant et approximata, deflexa, lanceolata, repanda acuta, fusco-viridia venosa, venulis transversis distinctis a primariis axis florifera pilosa, vaginis 3-4 hinc illinc vestita.

Spica 3-4 uncialis, pubescens. Bracteæ-lanceolatæ valde acuminatæ ovario breviores.

Flores antici ringentes axi adpressi.

Sepala ovato-oblonga, obtusa extimus pubescentia, antico majora petalaque superimposita lateralia paullo patula, alba, fusco-tincta.

Petala linearia, obtusa, albida.

Labellum basi saccatum parallelum tunc angustatum. Lamina transversa e lobis 2 quadratis patentibus, ungue saccoque aurantiaceo lamina alba, sacco intus processus cellulosus gerente.

Columna directione labello, sacca basi adnata nana, antica in rostellum bisubulatum product. postice inflatum in clinandrium.

Anthera columnæ parallel. clinandr. immersa, mobilis persistens. Connectivum lanceolatum rubrum *antice* productum, loculi membranacei *postice* producti, longitudine dehiscentes, sepato longitudinal. obsoleto binato repando.

Pollinia bipartibilia, lobulata attenuata in caudicula linearia, glandula ovato-lanceolata.

Rostelli processus apice subdilatati obtusi. Stigma punct. glulanos. utrinque rostell. processus baseos.

Columna facies antica apice processus 2 dentiformes gerit.

Ovarium fuscum, pubescente-pilosum lineis costisve placentas sterilis indicantibus albis.

HAB. In collibus, *Naga* : dictis, *March 9th*, 1836. Assam Herb. 418.

Hujus generis est Hypocephala mihi e Mergue. An Pterygodii sp. etiam in sylvis inter Gubroo et Jourhaut.

The processes visible on the anticous face of the stigma are certainly portions of the lamina forming the base of the labellum, cohering firmly to the stigma, hence the stigma is, as it were pushed out into the 2 glands visible at the base of each process of the rostellum. It is in fact actually separable by dissection.

2. *Pterigodii* sp.—Terrestris 1½ pedalis, caule basi decumbente, fol. perfectum medium versus axis sita breviter petiolata lanceolato-ovatave integro basi 3-venia, superne nitida, sublente minute cellulosa.

Spica pubescens, hinc illinc vaginis carneis squamato Bracteæ lanceolatæ, acuminatæ ovariis fuscis pubescente-velutinis æquantes brevioresve.

Flores parvi inconspicui, postici.

Perianth. ringens sepala extus pubescentia. antico cui petala supposita, late ovata apice deflexa, lateralia subinæqualia cordato-ovata, apicibus paullo reflexis, color fusco-viridis, apicibus carneo-tinctis.

Pet. sepalo antico supposita, spathulata lævia apice rotundata albaque cæterum viridescentia.

Labellum saccatum subglobosum, supra longitud. sulcatum, lamina sessilia minutissima cordata concava, basi cum columnn facie antica connata, processus cellulosis 2, sacco apice divis. dentat.

Columna nana, facies antico plana, labell. baseos laminâ apice bidentata, dentibus intus conniventibus cellulosis albis vestita, apice in rostellum brevem bipartit. product., dorso

inflata in clinandrium cujus parietes membranacei. Clinand, profund.

Anthera dorsalis columnæ parallell. mobilis persistens clinandrio immers.

Connectivum late ovatum acuminatum, loculi membranacei, deorsum paullo producti, septum simplex majusculum.

Pollinia bipartibilia pulverea, pollinula inferiora squamiformia in caudiculam linearem lutescentem attenuatum sessilia. Glandula carnosa alba ovato-oblonga. Stigma gibberem viscosum, utrinque rostelli et ad ejus basin.

HAB. In collibus *Naga*, dictis: *March* 10*th*, 1836. Assam Herb. 419.

Ejusdem generis cum præcedent.

POGONIA.

1. *Pogoniæ* sp.

Planta pusilla vix 4 uncialis.

Radix bulbiformis hinc illinc radiculas proferens.

Scapus uniflorus ante folia evoluta, bracteis vaginantibus, quarum infimæ squamiformes, hinc illinc vestitus.

Flos terminalis anticus nutans vel inclinatus ratione plantæ maximus longitudine unciam, latitudine unciam paullo excedens, aspectu primo florem Scrophularineæ cujusdem referens, explanatus, bractea lanceolata ovarium paululum breviore suffultus.

Sepala lanceolato-linearia, acuminata 8-lineis longa æqualia 3-venia, pallide fusca basi purpureo-tincta, lateralia patentissime,, postico labello subparallelo.

Pet conformia angustiore, paullo breviore patentissima, venis lateralibus inconspicuis, concoloria.

Labellum anticum porrectum cucullatum e calcaratum a medio infra columnam obvolvens, albumque, 3-lobum, lobis lateralibus rotundato-oblongis brevibus denticulatis albis, in-

termedio obovato integro crispato repando, medio inconspicue cristato, albidum purpureo-venosum maculatoque, crista a medio infra luteo-virid. marginibus papillosis cum columnæ base continuo.

Columna clavata semiteres, antico a stigmata ad basin fere pubescens, pede brevissimo curvato angulum fere rectum efformante. Stigma majuscula antica viscosa.

Clinandrium inflatum marginibus membranaceis subintegris. Rostellum latum breviter apiculatum.

Anthera terminalis mobilis persistens, opercularis maxima carnosa, quasi truncata bilocularis, loculis postice membranaceis: parietibus antice flexis, ovarium purpureo-fuscum sub-6-gonum.

Hab. Legi in campis *Suddyah: May* 5*th*, 1836.

Odor florum Vanillaceus, Labellum intus utrinque lineæ viridis, partes cucullatæ pubescens.

Pollinia non vidi.

2. *Pogoniæ* sp. Pl. CCCXLV.

Planta spithamæa. Terrestris. Scapus ante folia evolutus.

Radix orbicularis. Scapus crassiusculus superne sulcato-striatus, medium infra squamis laxiusculis vaginantibus obtectus, squama inferne albida vel brunnescens, reliquæ purpureo-viridescente, venis saturatius purpurascente. Bracteæ sæpius, reflexæ lineares, setaceæ.

Flores postici, pedicellis angulis ovarii decurrentibus angulatis, bracteis aliquoties brevior.

Perianthium ringens.

Sepala lineari-spathulata, lateralia paullo majora carinata, postico obsolete, carinis fusco-viridis paginis viridescent., vena intromarginali una lata vel duabus purpurascentia.

Pet minora, conformia concolora, venis lateralibus extrorsum ramosis.

Per. angulum obtusum formans cum ovario apice.

Labellum cucullatum basin columnam obtegens, lobis la-

teralibus dentiformibus, purpureo-venosis medio cordato paullo reflexo, villoso, viride venoso, color viride lutescens, cum columnæ basi continua et sacculum parvum efformans, columna ereti uscula clavata. Clinandrium obtusum 3-dentatum.

Anth. carnosa carnea.

Pollinia indefinite lobulata, hinc sulcata sulco in massulas 2 inæqualis divid. Gland. vel Rostellum revolutum materia viscosa replet. Stigma cordata viridescens materia viscosa nulla.

HAB. Burma at the lower Kioukdweng of the Irrawaddy above Ava in sylvæ arenosæ.

ARETHUSA.

Arethusa ecristata Gr.

[Perianthum ringens bilabiatum.

Labrum superum e sepalo postica et petalis tripartitis, inferior bilobum.

Labellum cucullatum intus cristatum cum pede columnæ articulatum.

Columnæ basi producta, apice dilatata, utrinque auricula carnosa auriculata. Anthera carnosa, exserta bilocularis. Pollinia 4 vix cohærentia. Stigmatis lob. postica proferens.

Spithamæa.

Radicum parasitum pallidum. Aphylla: flores albi.

Genus Arethusæ propinque.]

Explanation of Plates of Arethusa.

Plate CCCXLIII.

1. Young flower bud, posterior view, sepals not yet closed up, except at apices.

1*a*. Same parts spread open, the axils of the lateral petals are the young auriculæ no trace of a stigma.

1*b*. Same anther not deflexed.

2. Lateral view of column and lip at a more advanced step.

2*a*. Same lip deflexed, auriculæ and stigma anterior be-

tween the stigma and the broad attachment of the labellum, is a space communicating directly with interior of ovary, no placentæ at this time.

3. Lateral view of flower.

3*a*. Front view of ditto.

4. Oblique view of column and lip.

5. Front view of lip.

6. Lateral of column.

7. Front vertical of anther.

8. Pollen masses; 8*a*, Pollen grains.

9. Front of column anther removed.

10. Transverse of ovary.

12*a*. Ovula.

Pl. CCCXLIV.

1. Apex of axis, with bracteæ and their flower buds.

2. One of the upper flower buds, at the angles gibbosities are traceable, these are the rudiments of the sepals.

3. The lower front flower bud of the above no. 1, more enlarged, the three inner gibbosities mark the commencement of the petals. Intermediate stage *vide* Pl. CCCXLIII. Fig. 1. 1*a*, 1*b*.

4. More advanced flower bud, parts spread out, lip and anther erect and oppositely separated, no trace of the auriculæ now exists, and none of the stigma.

5. Vertical view of a more advanced flower, the central space is chiefly occupied by the erect anther, part of the labellum is also visible.

5*a*. Same parts spread out, no appearance of the auriculæ or of the stigmata.

6. Anterior view of flower bud, the sepals have not yet closed up so as to include the petals. To this series belong 2, 2*a* Pl. CCCXLIII.

6*a*. Same, two lateral sepals removed and the labellum de-

flected, the auriculæ now exist, as also the anterior stigma.

7. More advanced. Sepals and petals removed, labellum deflexed, the future parts of the column are now apparent, except the stigmata opposed to the two lateral sepals; the style of the anterior one exists.

7*a*. Dorsal view of the same with the exception of the labellum.

8. Column in front more advanced, traces of the two lateral stigmata are now visible.

8*a*. Long section of do. no traces of ovula at this period.

9. Front view of column, the three stigmata are now manifest as well as the aperture of the conducting canal.

9*a*. Long section of the same, the ovula are even now scarcely traceable.

In this plant the steps in the development are precisely as in the Dicotyledons I have examined.

The immediate apex of the axis is a convex, fleshy, smooth looking body, just below it will be found other convexities, the commencement of the bracteæ, and in the axils of those a little lower will be found other convex bodies, the young flowers; the convexities become depressed or flattened at the apex, then this part becomes triangular, then the angles are developed into teeth, the apices of the young sepals. The discoid space between these next presents another alternating triangle, the angles of which represent the inner laciniæ of the perianth.

The posticous petal from a very early period takes on powers of growth superior to those of the lateral ones, it also closely resembles the first developed and only perfect stamen, which is of considerable size even at a very early period.

The next growths that appear are the lateral auriculæ they are obviously opposed to the lateral sepals.

The stigmata are the last to make their appearance, and it is the anticous which is first developed, indeed almost perfect-

ed before the stigmatic surfaces of the two lateral carpellary leaves are developed.

The ovula are of remarkably late development, at the time of expansion, they are mere points of expansion of the placentæ, and they do not acquire their perfect inversion and structure until long after the fall of the perianth, and the application of the pollen to the stigmata, the ovaria at this time being of a yellowish colour.

The stigmata of the perfect flower are certainly three, of these the anticous one is furnished with a short and stout style, forming the base of part of the clinandrium, it is largest, and does not touch the two lateral ones. These are rather obscure, but exist in the shape of two masses of stigmatic tissue, in close approximation forming the lower part of the viscid space, between these and the anticous one there is a considerable sized stigmatic canal.

These stigmata may be traced much earlier than I thought by a greater cellulosity round the lower margin of the chink, but the appearances are obscure.

This instance appears to me to corroborate the accuracy of Mr. Brown's hypothesis of the structure of Orchideæ, at least of the less developed forms.

The appearance of the two abortive stamina, which afterwards are called the auriculæ, subsequently to the development of the anticous stamen, to say nothing of their situation relatively to the parts of the perianth, is strictly in accordance with Mr. Brown's views of their belonging to the inner series.

The anticous stigma never presents any appearance of forming a part of an involute leaf. Even at the earliest stages, I have examined it, it has the appearance of an angular body, glandular slightly convex on its upper front surface. I have not seen any traces of any separation of the style, corresponding to the other stigmata. This is remarkable enough, for the carpella are equally formed, instances however of inequality of styles are not uncommon, although I know of none in which is the earliest stages they are not equal.

The construction of this tribe of Orchideæ is as follows:—

3. Sepals.
  3. Petals.
1. Stamen imperfect.
  2. Stamina imperfect.
3. Carpellary leaves.

The posticous stamen of the inner series. ⎫
The two lateral stamina of the outer. ... ⎭ Are wanting.

The costæ of the ovary corresponding to the sepals, are not completely separated from the others.

In addition to Mr. Brown's objection relating to the situation of the placentæ, I may add that if the carpellary leaves be considered as 6, then the placentæ of each fertile carpellary leaf must be considered as distinct, which is contrary to all analogy, for no instance is known of a compound ovarium having simple placentæ.

No instance is known of which the placentæ of a compound ovarium are not themselves compound.

The Rhizomas of this plant consist chiefly of cellular tissue, most lax towards centre.

Most of the cells of the laxer part have sticking to one side *generally* the *inner?* a greater or less heap Amylaceous granules, acted on by Iodine, and besides are gorged with minute granular matter, this is rendered brown by Iodine.

The outermost row has no contents and is 1-seriate, apparently at right angles with the rest.

The amylaceous granules or cells towards the circumference are few and generally not aggregate.

The rhizomata of Pogonia are plicate and also abundant in amylaceous granules of larger size, but in this with the exception of a zone nearest the circumference, they are chiefly irregularly distributed along the course of the vessels, cells gorged with very minute granular matter also exist and perhaps independently of those amylaceous ones.

There is not much distinction between the structure of the leaf in Pogonia.

The under surface is stomatose, the upper has large cellular hairs along the ribs, and veins. The green parenchyma occupies the *outer surface*, that below the veins, is globose and less green, that above, or in relation with the upper surface oblong, placed at right angles to the surface, and is considerably green.

Affyanisthan, 1839.

Anthogonium Pl. CCCXLV. Fig. II.

Caules basi in cormum globosum dilatati, cormis apices versus foliorum vestiguis vestitis.

Scapus pedalis vel 2½ pedalis hinc illinc bracteis vaginæformibus, limbo obsoleto tectis. Spica terminalis multifloris, pedicelli basi bracteo minute persistente donat. ovario multoties brevior.

Flos cum apice pedicelli angulum rectum formans! oblique insertus.

Per. explanatum. Sepala difformia postico oblongo lineari-obtusiusculo, lateralia limbo late ovato, inter se in tubum cylindricum basi gibbosum coalit. lateralia reflexa, terminali recto ascendente.

Pet. utrinque, sepali postici applicit. eoque margines secus leviter adnata, longissima unguiculata limbo anguste lanceolato, bases versus vix libera.

Labellum cucullatum subinfundibuliforme late cuneato-obcordatum, inferne attenuatissimum et fere unguiculatum basi paullo gibbosum rosaceum, maculis sanguineis, margine apicis utrinque subauriculato, inferior vel basi versus cum columne accretum. Columna clavata semiteres, apice incurvata a medio supra libera simplex apice obtusa 3 dentata. Rostellum clinand. basi formans, antice emarginatum convexiusculum.

Anthera terminalis, dente postica columna affixa, bilocularis, loculis subbilocellatis.

Pollinia 4 accumbentia? ovato angulata hinc plana, ope materia viscosa pulverea cohærentia.

Genus distinctum.

Flos fumarioideus, purpureus. Columna apex eodem colore. Fol. senilia linearia angustiss. acuminata plicata? Ovar. teres, anguste subovat. 3-banded, the bands originating from the sterile carpells. the placentiferous angles subobsolete externally.

The following remarks refer to the same species :—

Rhizomat. repent. pseudobulbis obsoletis, fol. lanceolatis plicatis acuminatis, scapis spithamæis, bracteis membranaceis sphacelatis hinc illinc vaginatis, floribus dense racemosis secundis, bracteis ovaria paulo excedentibus, floribus pallide citrinis.

Per. vix explanatum, sepalis oblongis lateralibus subcalcaris basin coalitis.

Pet. oblonga, labellum 3 lobum, lobis lateralib. oblongis, terminali bilobo, cristæ 2, elevatæ ad ejus basin.

Columna semiteres. Rostellum acutum. Calcare subulato-obtusum, limbum subæquans.

Pollinia 8 per paria accumbentia quaternatim cohærentia. Caudicula pulverea bifida. Glandula oblongo-hastata, aspectus florum fumarioides.

Hab. *Churra: October* 12*th*, 1835, Assam Herb. 50, and 163.

Spiranthes.

Spiranthes Pl. CCCXLVIII.

Terrestris spithamæa pedalisve. Radices carnosæ cylindricæ crassæ, *descendentes*, fol. ad apicem caulis abbreviato-conferta anguste lanceolata, acuta repanda, 1-venia infime in terram decumbentia, et in petiolum attenuata, summa ad bracteas lanceolatas vaginantis redacta, axis florifere bractea foliac. summar. supra pubescens, cæterum glabra.

Bracteæ ovatæ, acuminatæ vel lanceolatæ concavæ, ovaria superantes bases versus pubescentes.

Flores spicati et spiraliter dispositi, juniores vel alabastri in spira gemina quæ per elongationem caulis apparenter simplex coadit.? axi adpressa parvi, albi inodori.

Ovarium sepalorumque bases glanduloso-pubescentes.

Perianthium cellulosum ringens.

Sepala oblongo-lanceolata, lateralia paullo minora, posticum fornicatum cum petalis paulo brevioribus oblongis apice truncatis, galeam 3-dentatum efformans.

Labellum cucullatum cum columnæ basi continuum oblongum integrum, versus laminam reflexum, lamina cellulosissime crispata repanda.

Columna teres brevis, antica productum in rostellum brevem, bipartitum, postice excavata, (clinandrium) marginibus excavationis membranaceis denticulatis, *auricula* hinc filamento basin utrinque hujus præsertim incerta est, cellulosa, oblonga integra, dentatave adjecta.

Anth. dorsalis mobilis sessilis directione columnæ persistens? immersa bilocularis, loculis discretis longitudinaliter dehiscentis, *septa obsoleto,* connectivum a medio infra carnosum, gibbosumque.

Pollinia pulverea alba bipartibilia, exteriora a medio infra interiora convoluta, itaque incumbentia. attenuatim in glandulam inter crura rostelli brevia, cuneata sessilia. Glandula oblongo-lanceolata.

Pollinia valde inæqualia, exteriora multo majora, involuta, interiora minora in sinuum involutionis recept.

Hab. In graminosis campis *Suddyah* : *February* 6*th,* 1836. *Assam Herb.* 389.

Labellum intus basi utrinque glandula sessile suborbiculari-stipat. junius columnæ marginibus ejus medium versus leviter adhærens. Ovarium irregulare, dorso nempe longius basi solidum.

Genus vix retinendum, et potius Neottiæ conjungendum. Pollinium structura an vere diversa. Granula 3-4-*natim* composita sunt et mutuo adhærent, materia propria nulla nisi glandulam prope.

The following refers to the same species as found.

Also in the Sunderbunds of Bengal, *February*, 1844.

Stem 1½ or nearly 2 feet high, almost a scape.

Leaves except the radical or lower ones, linear lanceolate, with long sheaths, the limbs of the uppermost appressed to the scape, which is upwards pubescent.

Spike 4½-5 inches long, performing 1½ spire glandular pubescent.

Flowers close together, each with a glandular pubescent linear lanceolate bracte, rather longer than the ovarium, white with a very faint odour like Polianthes tuberosa.

Sepals 3, linear oblong, slightly glandular pubescent sub-recurved, palid towards the points lateral.

Petals about as long as the upper sepal, with which they form the upper lip which is hence 3-dentate.

Labellum reflexed above the middle of the lamina, suboblong reniform, with irregularly dentate margins, margin on either side towards the base with a largish callosity, continuous with the ovarium, margins adhering slightly to the sides of the column.

Columna short roundish, corresponding only with the upper part of the ovarium, between its base and the labellum is a whitish subconcave space.

Stigma large green viscid obliquely terminal.

Anther membranous brownish. Pollen powdery, quaternate in pairs, sessile on the gland.

Rostellum acutely and deeply bifid into two linear segments, lateral and posterior margins of the clinandrium membranous.

Brought by my plant collector Akkul Mahomed from the *Sunderbunds*: *February* 1844.

Also found by me at *Saddyah* in upper Assam in 1836. See Assam Herb. 389.

Goodyera.

1. *Goodyeræ* sp. Pl. CCCLI.B. Fig. 15.

Terrestris, spithamæa caule simplici terete basin versus fusco carneo.

Folia plura, summo ad bracteas reducto, linearia acuta, lineam latitudine, basi breviter vaginantia, 1-venia, cellulosa, supra fuscescentia subtus albida.

Spica terminalis uncialis pluri flora, bracteæ colore foliorum, marginibus membranaceis albidis ovatis, acuminatis, ovaria superantes.

Flores subtrifariæ, secundæ albæ, alabastre tantum vidi, quæ antica sunt.

Ovarium ventricoso-ovatum griseum celluloso-nitidum paullulum tortum exterius costis parum prominulis perianthiis laciniis exterioribus oppositis.

Perianth. connivens, cellulosum, sepalum posticum majus fornicatum lanceolatum basi saccatum, acutum, lateralia lanceolata æqualia, acuta.

Petalia sepalo postico supposita, sepala lateralibus conformia.

Labellum columnæ parallelum, concavum carnosum integerrimum, obtusum, cum columna basi continuum.

Columna nanissime antica planiuscula parietibus posticis brevissima marginibus medium versus in auriculis 2 cellulosis anthera incumbentibus productis, antice bipartitis (rostellum) in processus subulato-linearibus ad harum bases et auriculis contigua utrinque glandula viscosa sita est.

Anthera dorsalis columnæ parallelæ, hujus concavitate immersa breve *filamentata* membranacea, connectivo rubro, bilocularis loculis longitudinaliter dehiscentibus, longitud. et incompleto biseptatis, septis sinuosis approximatis.

Pollinia 2 elastico partibilia in caudiculam spathulatam massarum longitudine marginibus subinvolutis sessilia.

Glandula cuneata, inter rostellum arcte recepta.

In campis *Suddyah*: *February* 1*st*, 1836. *Assam Herb.* 365. Ejusdem generis cum Pterygodio sulcato Roxb. sed specifice diversa. Huic forsan referenda Orchidea Neotteoides e Jeypoor cujus habitus omnino similis vide no. 387.

2. *Goodyeræ* sp.

Planta terrestris caulefoliis que, præsertim hoc basi, rubro carneove tinctis, fol. ascendentia, petiolis membranaceis basi breviter vaginantibus, linearia acuminata, 1-lineam latitudine, fusco-carnea, 1-venia cellulosa, aspectu obsolete velutino. Spica terminalis conica densiflora. Bracteæ lineari-lanceolatæ fusco-rubescentes marginibus membranaceis, inferioribus basi 3-veniis, venis rubris, ovaria excedentes.

Flores obsolete secundi nutantes parvuli inodori. Sepala petalaque alba labellum a medio extrorsum luteum basi album.

Perianthium ringens anticum cellulosum, vel resupinatum. Sepala oblonga, obtusa, 1-venia, lateralia semi-patentia, posticum porrectum basi in gibbere breve productum cum petalis ovatô, oblongis 1-veniis margine superiori obliquis suppositis galeam efformans.

Labellum basi gibbosæ marginibus columnæ marginibus usque ad rostellum basin adnatum, hincque cucullatum.

Lamina basi constrictiuscula, apicem versus transversum subreniformis.

Columna nanissima membranacea postica (clinand) inflata directione obliqua, antica in rostellum bipartitum product, antica plana, labella basi adhærente omnino tecta.

Clinandrium margines integrum cellulosum

Stigma glandula viscosa utrinque columnæ ad basin versus rostellum.

Anthera membranacea persistens, clinandrio immersa sessilis, loculis amplis discretis, membranaceis longitudinaliter dehiscentes, longitudinaliter ast obsoletissime bi-septata, septis utriusque approximatis, repandis.

Pollinia elastica pulverea, bipartibilia obovata in caudiculæ spathulatæ marginibus incurvatis apicem sessilia. Massulæ majusculæ. Glandula consistentia caudiculæ, et quasi e parte ejus antica inflexa formata, ovato 3-gona angulo 3-tio postico.

Ovarium tortum, celluloso-griseum.

HAB. Upper Assam. In campis graminosis prope Suddyah: *February 4th,* 1836. Assam Herb. 387.

OBS. Huic proxima est Orchidea no. 365, habitu omnino similis, discrepans tantum forme labellum clinandriumque marginibus hinc 1-dentatis, floribusque utpote secundis 365 certe varietas forsan immatura, labellum nempe plus minus dilatatum est apicem versus, flores majis connaventes sunt, clinandria integritatis flocci habenda.

3. *Goodyeræ* sp.

Terrestris 1½-2 pedalis, caule cylindrico crasso glauco.

Fol. petiolis dilatata membranacea basibus vaginantibus, lanceolata acuta carnosa, glabra, lucida, supra læte viridia, subtus pallida, *a basi* sub 7-venia, 2 lateralia incompletis, venulis aliis pluribus longitudinaliter interjectis, transversis anastomosantibus crebris, superiore bracteiformia convoluta, lamina, nempe obsoleta.

Flores in spicam terminatem pubescentem anguste conicei bracteatam subsessiles, minuti inconspicui albidi demum brunnei incompleti antici. Bracteæ lanceolatæ ovaria mature paullo excedentes.

Perianthium globosum, connivens, anticum. Sepalum posticum oblongum, acutiusculum fornicatum.

Lateralia ovalia obtusa, postico breviora. Petala lineari-spathulata longitudine sepali postici, cui supposita fornicatim sunt.

Labellum sacciforme cucullatum cum columnæ basi continuum carnosum, sacco intus pilis cellulis pluribus *hispido.*

Limbus brevissimus, nanus, cordatus deflexus, basi et saccum intus bigibbosus.

Columna nana semiteres, facies antica ovatis, plana fere omnino stigmato viscoso superficiali occupata, superne producta in rostellum bifidum, postice semiteres, margine subintegro.

Anthera dorsalis mobilis, directione obliqua quoad columnam, semi-immersa, *sessilis*, connectivum latum carnosum fere cordatum, loculi 2 membranacei, obsolete longitudinaliter simpliciter septati.

Pollinia 2 postice bipartibilia, spathulato-obovata, in glandulam linearem, antice acutatam inter crura rostelli arcte receptam ima adhærentem attenuata. Stigma supera quasi truncatam medio obscure foveolatum.

Ovarium subcylindraceum, costis 3, vel lineis sepalis oppositis externe notatum, subglabrum.

HAB. Collibus Aborensibus allata, *February* 1*st*, 1836. *Assam Herb.* 366.

Videtur esse species Goodyeræ.

4. *Goodyera.*

Terrestris, caule erecto crasso pedali vel sesquipedali.

Folia plura, vaginis carnosis, albidis, petiolis latiusculis marginibus involutis, lanceolata acuminata, subrepanda sub 5-venia, vena primaria tantum distincta, lutescente viridia, summa ad vaginas redacta.

Spica densa conica pubescens. Bracteæ pubescentes lanceolatæ alabastra globosa, postica in spiris a dextro ad sinistio tortis arcte disposita. Sepala late ovata subæqualia, antico petalis superimposito, fornicato, viridia apicibus alba.

Pet. spathulata, apice rotundata margine inferiore obliquo, superiora ciliato-alba.

Labellum sacciforme rotundatum, album a medio infra viridiam medium versus bigibbosum, gibberibus parum prominulis spatio inter hæc et basin processubus numerosis cellulosis clavatis subsimplicibus occupato.

Lamina minutissima cordata concava, et subconduplicata lutescens.

Columna nana, semiteres apice excavata in clinandrium profundum, marginibus membranaceis integris.

Rostellum ovatum acutum.

Stigma transversim margine inferiora incrassato.

Columna substigmatosa geniculata, anthera terminalis basi clinandrio immersa directione columnæ, connectivum late ovatum, bilocularis.

Pollinia pulverea in glandulam ovatam sessilia.

Hab. In rivulo, rupes super, in collibus *Naga* dictis, *March* 10*th*, 1836. Assam Herb. 420.

Alabastra sæpe deformata, stigmata nempe ampliato, clinandrio quam maxima superficiali. Alabastra juniora tantum vidi.

Ejusdem generis cum. No. 366., cui etiam specifice valde affinis.

5. *Goodyera affinis.* Pl. CCCLI. B. Fig. 7.

Terrestris. Caulis erectis sesquipedalis basi decumbens radicans simplex? sæpius apicem versus prolifer.

Folia inferne ad vaginas fere reducta summa rosacei patula ovato-lanceolata acuta repanda, suboblique, 3-nervia, viridia subtus albescentia.

Spica terminalis stricta pubescens hinc illinc squamis vaginata, carneo-viridis. Bracteæ angusti-lanceolatæ carneæ velutinæ, infima ovaria pubescentia subæquantia, summa superante.

Flores 4-fariæ dispositæ erecti; alabastra subgloboso-conica, glanduloso-velutina, viridia apicibus fucescentibus, postica.

Sepala cordata obtusa 3-venia obtusa.

Petala quasi unguiculata, ungue viride, limbo subcordato albo sepalo *antico* supposita leviterque adnata.

Labellum saccatum, subglobosum ecalcaratum. Lamina minutissime cordata crystallino-cellulosa, alba, cæterum albido-fusca.

Columna labello parallelum nanum, *antice* gibbosum utrinque glandula (stigma) stipata.

Rostellum bipartitum, laciniæ subulatæ, acutiusculæ et breviusculæ.

Anthera membranacea, columnæ paralleli mobilis, bilocularis locularis incompleti ? longitudinaliter locellatis albido-fusca, ovata. Massa pollinis 2, longitudinaliter bipartitæ, clavata in caudiculum attenuatum, elastica sectilia caudicula *nuda* brevis. Glandula oblonga diaphana inter crura rostelli recepta.

Sacca labelli intus medium versus appendice carnosa apice bifido repando stipata.

Columna faciea interior planiuscule, apicem versus vel rostellum basi versus processum parallelogrammicum cellulosum album gerens, cujus apex glandulæ adjicitur an stigmatis officio fungitur.

Processus saccæ apice hippocrepidiform, sinu interne sito.

Hab. In sylvis, *Negrogam* propin: *January* 18*th*, 1836. Assam Herb. no. 315.

6. *Goodyera.*

Terrestris caulescens, fol. laxe vaginantibus, vaginis albis viridi-striatis, fol. ovatis acutis sub 5-nerviis albo-maculatis tinctisque. Spica terminalis pubescens, bracteis lanceolatis pubescent, ovaria subæquant. Ovariis pubescentibus, floribus parvis albis, marcescent, tantum vidi.

Per connivens, sepal oblongo-lanceolata subæqualia lateralia, basi suboblique gibbosaque. Pet. angustata marginibus sepali postici adnatis.

Labelli in basin saccatum, limbo integerrimo linguiforme, carinato, conduplicato.

Columna nana. Rostellum elongatum bicrure, cruribus longissimis, subulatis anthera dorsalis, basi clinandrio immersa. Stigma anticum faciei columnæ occupans. Pollinia non visa.

Hab. In sylvis, *Surureem: Nov. 2nd*, 1835. *Assam Herb.* 187.

7. *Goodyera secundiflora* Gr. Pl. CCCXLVII. Fig. 2.

Caule erecto basi radicante, infene foliorum vaginis terete medio vel apicem versus folia 2-3, ovata, in petiolum attenuatum acutiusculum repandum.

Spica terminalis, densiflora, pubescens. Bracteæ lineares subfalcatæ flores superantes.

Flores subsecundi, marcescentes fusci. Ovar. pubescens. Per. connivens subclausum. Sepala lanceolato-acutiuscula æqualia, 3-nervia, lateralia basi gibbosa.

Pet. angustiora 1-nervia sepali postico marginibus oppositi Labellum basi saccatum, columnæ facie anticæ oppositum, limbo linguiforme, carnoso, bicristato? marginibus membranaceis crispatis, subconduplicatam. Rostell. bicrure, cruribus ut in præcedente.

Anth. rostrata, basi immersa dorsalis. Pollinia in glandulam linearei-carnosum, sessilia et attenuata marginei antica glandulæ attingentia. Columna antico læviuscula.

Hab. In sylvis inter *Surureem* et *Moflong*: *Nov. 3rd*, 1835. *Assam Herb.* 188.

8. *Goodyera hirsuta* Gr. Pl. CCCXLVII. Fig. I.

Caulis viridis. Petioli basi vaginanti cinerea cæterum subviridescent. fol. supra læte et saturate viridia lucida, subtus subglaucescent. sub 7-venia, venis infra prominulis.

Scapus vel potius spica fuscescens. Bracteæ brunneo-ferrugineæ, uti perianthium clausum post anthesin ovariaque.

Sep. fuscescent, lateralia patentia. Pet. concol. Calcar pallida ferruginem hyalinum. Labellum fuscescens, lamina alba.

Hab. Nempean versus. On the Burmese Frontier of Assam 1837.

9. *Goodyeræ* sp.

Terrestris caule spithæmæa vel infra basin radicante. Fol. late ovata in petiolum complanatum, subattenuata tenera obtusi-

uscula, superne velutino nitentia, sub 3-nervia, caule superne ovariisque piloso pubescentibus, bracteis basi vaginantibus convolutis acuminatis pubescentibus carneis 2-3 donato apice, 1-3 floro.

Bracteolæ bracteis similia sed minora, pedicellos glabros duplo superant. floribus nutantibus, albis, extus pubescentibus.

Per connivens ringens. Sepala lineari-oblonga obtusiuscula, paullo infra medium coalita in tubum, lateralibus basi obsolete gibbosis.

Pet. lineari-spathulata quasi unguiculata sepali postico longitudine, et ejus marginibus semi-adnata.

Labellum subcucullatum basi cum columna connatum et saccum bigibbosum oblonge, ultra basin columnæ nec elongatum formans, ungue angustato, limbo subobreniforme basi utrinque macula viride cæterum album, fimbriato-pectinatum. Saccum seriebus 2 utrinque papillorum cellulosorum continet.

Columna nana, antice planiuscula, elongata in crures 2 albos membranaceis.

Rostellum basi viridescens, elongatum crures columnum subæquans, apice bipartit.

Anth. dorsalis membranacea bilocularis.

Pollinia in caudicula linearea attenuata sessilia. Glandula carnosa linearis alba, caudiculæ fere longitudine.

HAB. Ḳhasyah mountains. In sylvis *Mamloo*: raro *October 27th*, 1835. *Assam Herb*, 179.

10. *Goodyeræ* sp.

Terrestris; caule sesquipedali basi decumbente radicanteque terete lævi rubro brunneo.

Petioli basi vaginantes sursum angustati-rubescentes.

Fol. ovata acuta lævia viridia, 5-venia, venis lateralibus cæteris minus distinctis, supra obscure lucida, sed nullo modo crystallina.

Spica terminalis in axin angustata, piloso-hispida hinc il-

linc bractea vaginante apice viridia cæterum rubescentia carnea sita ad hujus apicem tantum sita, pauciflora.

Bracteæ ovato-lanceolatæ membranaceæ, carneæ, pubescentis ovaria excedentes. Alabastra quæ paulo ante expansionem tantum vidi postica, ovar. fusco viride albido pubescens.

Perianth. extus hispidum, pilis albis quæ sæpissime deflexis vel potius refract.

Sepala ovato-oblonga, obtusiuscula lateralia paulo majora, fusco viridia apices versus et præsertim anticum plus minus albescentia, anticum planum.

Pet. lineari-spathulata angustissima, sepalo antico supposita apicibus albis cæterum fusco-viridia.

Labellum cum columnæ basi continuum basi saccatum lamina transversa alba, biloba, lobis subquadratis.

Sacca intus utrinque et basi versus continet, processus cellulosus complanatis 2-3, apicibus crenato-repandis.

Columna nana, hinc utrinque dente membranacea aucta, facies antica centrum versus processum cellulosum cristiformem basi mediante labello cum dente laterali continuum.

Stigma vero anticum inconspicuum canali inter faciem anticam et faciem processiferumquæ verisimiler pars labelli.

Columna, stigma supra in rostelli processus 2, subulatus product. Facies postica, antea alabastri integra membranacea, basi in gibberem quasi inflata.

Anthera ovata carnosa, dorsalis mobilis, columnæ parallela, connectivo nempe maximo albo, loculi 2, sursum valde angustat. obovato-pyriformes medio longitudinaliter incomplete biseptate.

Pollinia elastica sectilia, loculis antheræ conformia attenuata sessilia in glandulam lanceolatam carnosum albam, marginibus tenuibus hyalinis. Pollinula longe squamiformia.

Hab. In sylvum cum Thea occurit *Tingree: February 23rd*, 1836. Assam Herb. 406.

In one out of the two specimens gathered, a curious deformity occurred. It consisted of a total suppression of the

Rostellum and its gland. The anther preserved its usual form and the pollinia were perfectly developed. The back of the column was separated, and totally distinct proving it to be the filament. The stigma lined the whole cavity in which in the normal forms the cells of the anther are immersed. The stigmatic canal was fully developed and communicated freely with the ovarial cavity. Thus instead of the stigma being anticous, it was in the bud at least, posticous.

11. *Goodyeræ sp.* Pl. CCCXLVI. Fig. I. Itinerary notes p. 36, no. 591. *Cherra Ponji: October*, 1837.

ZEUXINE.

1. *Zeuxine sulcata* Gr. Pl. CCCXLIX.

Pedalis, stricta, folia lineari-lanceolata viridi-*reticulata* ovario pubescente, sepalis lateralibus labello omnino suppositis, labelli utrinque insertione 1-gibbosi lobo centrali sessili columna oblique.

Z. sulcata Gr. spithamæo, ovario glabro, sepalis lateralia medium supra reflexo-patentibus labelli fundo bicristato lobo centrali unguiculato columna depresso horizontali.

HAB. *Doolall.*

Caulis 1-1½ pedalis, strictus. Folia basi altiuscule sheathing linear sublanceolate acute margins become revolute during drying with a mucro, herbaceous tendency of a yellowish hue, with the veins and venules very conspicuously green. The uppermost gradually pass into the bracteæ, so that the stem above the middle has no true leaves.

Spike about a finger in length subcylindrical erect. Bractes lanceolata acuminata membranaceous fawn coloured about the length of the flowers.

Flowers white scentless, small.

Ovarium ovate oblong, pubescent, (except costæ).

Perianthe galeate, ringent, upper lip or casque formed of a large oblong sepal and two supposite more membranous petals, lateral sepals oblong equal to the posticous one. Petals.?

Labellum about the length of the sepals cellular, lamina fleshy base sulcate beneath on either side of attachment a small gibbosity, limb as it were made up of two wedge-shaped lateral parts, conduplicate yellowish crescent-shaped or cuneate crescent shaped with divaricate ascending lobes, remainder calceolariform, fleshy, thickened so as to assume an appearance of inflexed margins towards the lamina where also it is papillose.

Column minute, very oblique on its dorsum and there forming a membranous clinandrium. Anther ovate sagittate base buried in the clinandrium. Pollen masses 2-lobulate, each combined of 2 caudicula moderate yellow. Gland linear whitish. Rostellum bilobed, lobes rounded stigma inconspicuous.

This genus and also *Herpysma* Lindl. shews that the characters of the pollen masses of this tribe are not to be depended on for higher distinctions than genera.

Lindley's character as given by Endlicher does not mention the Pollen masses as sectile.

There are other, or at least one other Indian form with sectile pollinia, which differs from Zeuxine in the stigma occupying the face of the column or rather in the want of adhesion of the labellum to the column, which in Zeuxine extends as high up as the base of the rostellum in some as in the Bootan one alluded to below, produced into crura like those of the rostellum itself entirely concealing the stigmatic surface, which is in some as it were pushed out on either side, in the form or appearance of a gland.

There are several species of the genus, as the following *Goodyera moniliformis.*

2. *Zeuxine moniliformis* Gr. Pl. CCCL. Itinerary Notes p. 143, no. 679.

1. Plant natural size, flower viewed laterally.
2. Flower enlarged, two lower sepals removed.
3. Do. upper sepal and petals partially separated and thrown up, labell. cut away.

4. Front view of labellum and column.
5. Upper of pollinia.
6. Do. lateral.
7. Front view of column, *a a* denote the lines whence the labellum separates leaving a plate pretty firmly adherent to the face of the column and produced upwards into two horns, which conceal the rostellum and gland from view.
8. A similar view the two horns reflexed, to shew tha rostellum and gland, marks the decurrence of the stigma which is squeezed out on either side.
9. Long section of flower, *a* is the line of separation between the anterior face of the column and the plate of the labellum.

HAB. Bootan Hb. no. 679. Mergui Hb. &c.

CHRYSOBAPHUS.

Chrysobaphus Roxburghii.

Caule simplici basi decumbenti foliosa, fol. breve-petiolata, petiolis basi vaginant. ovato-cordatis acutis velutinis atro-fuscis venis areolatis aureis vel mineatis pulchre insignitis, subtus rubescentibus spica erecta pauciflora pubescens, bracteis ovario duplo brevioribus, carneis ovariis fusco-viridibus pubescentibus sepala herbacea, lateralia repanda.

Petala huic secus margines connata, albida, et viridecentia. Labellum album calcare conico, limbo paulo ⅓ breviore, bilobum, lobis *accumbentibus* truncatis integris, medio fimbriatum, antica ad basin limbo callis 2 elevatis, columnam superantibus.

Glandula lanceolata antica acuminata massæ pollinis 2, ane 4 cohærentia, massulæ in caudiculam pulchre transverseque squamatam dispositæ.

Conu labelli intus utrinque massam reniforme crispatam stipitatam continens.

HAB. Khasyah mountains Cherra Ponji *Assam Herb* 48.

Appendix to Orchideæ.

1. *Liparis.*

Epiphytica cæspitosaque.

Rhizomat carnosis crassis, vestigiis squamarum vestitis, in pseudobulbis cylindraceo-clavatis lævibus squamis lanceolatis latere exteriore vestitis interiore nudis.

Folia bina alterna, petiolis basi vaginantibus præsertim folia inferioris linearibus, ½ uncialibus latitudine mucronatis, 1-veniis pallide viridi lutescentibus, apicem versus semitortis.

Racemo terminali e sinu folii superioris erecto folia excedente, parte florum nuda, valde compresso-ancipite, medium versus suprave bractea conduplicato lineari-acuminatis pallido suffult.

Floribus numerosissimis axi tereti, posticis parvis, inconspicuis, albidis, bracteis linearibus angustissimis, infimis ovaria superantibus summis nec æquantibus.

Sepala oblonga acutiuscula, alba, marginibus demum revolutis.

Pet. linearia aliquoties angustiora sepalis, eadem longitudine cellulosa.

Labellum oblongum medio deflexum integerrimum, parte deflexa, celluloso-papillosam brunneo-pallidissime tinct.

Columna clavata arcuata teretiuscula a basi angustata, apice dilatata.

Clinandrium margo anticus truncatum, integrum. Stigma punctum sub 3-gonum, angulo tertio inferiori.

Pollinia 4 per paria collateralia subæqualia, anthera bilocularis, loculis discretis, dorso carnosa.

In arboribus *Suddyah*: *January* 15*th*, 1836. *Assam Herb.* 296.

2. *Liparis.*

Planta paludosa stricta 3 pedalis, caulis basi bulbosus. Folia subpedalia conduplicata insigniter plicata subobtusa carnosa læte viridia.

C. floriger robustius angulatus partis e floriger ad medium bracteis 2 suboppositis linearibus ½ uncialibus, pars floriger 1¼ pedalis. Bracteæ ascendenti lineares canaliculatæ longitudine pedicellorum angulatorum fructus erecte clavato, 6 angulari, (inter angulis angulos minores exhibentibus) angulis sæpe denticulatis.

Flores resupinati mediocres pedicell. in ovarium attenuatis albido virescens. Sepal postio lineari cum petalis conformibus sed angustioribus ob margines revolutos teretia, color flavide viridi purpurascens; lateralia oblonga reflexo revoluta, explanata labello supposita, viridescentia, margo exterior purpurascens.

Labellum subparallelogrammia arcuato-reflexum emarginatum basin bicallosum, brunneo purpur. margo summus denticulatus. Columna e basi tumide arcuata sursum ampliata, semiteres pallida, anthera carnosa, mucronata bilocular. Pollinia 4, subobovata per paria collateralia.

HAB. In a marsh in a nutmeg plantation near the waterfall. *Penang: January 2nd*, 1845.

3. *Cœlogyne trisaccata* Gr.

Rhizomat crassa, flexuosa flexuris brevibus, novellis squamis laxis vestitis.

Pseudobulbis ampullaceis obclavatis, lævibus teretibus, basi squamis membranaceis binus magnis, bulbum subæquantib. stipat. Folia 2, lanceolato maxime, 1½ pedalum, 4 unciali latitudine acuminata subcoriacea, conspicue 5-nervia plicata, repanda.

Racemi terminales, fructiferi penduli infra filiformes sursum incrassat. Pedicella bracteærum reliquis scariosis adhærentibus plus minus obteres. Ovar. ovato-pyriforme, 6-alatum, alis carnosis rigidis acutis albidis, his placentis oppositis duplo fere majoribus.

In hoc specimene unico flos. unicus *radicalis* aderat cujus pedunculus elongatus, bracteis 2 carnosis arcte vestientibus

3-tia summa omnino inclusa apice summo excepto omnino tectus. Bractea 4, foliacea, convoluta, suborbicularis.

Pedicellus brevis vix ½ uncialis ovarium longitudine alabastrum superne convexum, infra planum, longitudinaliter sulcatum, basin 3-gibbosum, postico gibbere distinctiore.

Per connivens ? Sepala alba, oblongo-linearia obtusiuscula, nervo centrali externe prominulo vix carinato, posticum brevius, basi in gibberum distinctum product, lateralibus discretis in gibberibus 2, rotundioribus. Pet. longitudine sepali postici, linearia, angustissima.

Labellum cucullat. columnam in super convolut. longitudinaliter venosum, basi bigibbosum, 3-lobum, lobis lateralibus rotundatis, repandis terminali oblongo, ut apicem biauriculat. auriculis denticulatis *(quadratis)* lutescentibus, æstivatione intus inflexsis.

Columna elongata clavata semiteres utrinque marginata, marginibus apicem versus alæformibus, anther ½ obcludentibus integris.

Rostellum descendens acutum. Anthera terminalis, dente postica infra apicalam affixa.

Pollinia 4 incumbentia obovata complanata materia viscide glandulam, mentiento cohærent.

Anthera bilocularis, septo longitudinaliter undulato germinato, valde incompleto. Pollinia faciebus approximatis longitudinaliter propinque sulcat.

Churra: *October 24th*, 1834. *Herb.* 166.

C. Gardneriana valde affinis.

C. trisaccata. Pseudobulbis teretibus obclavatis ampullaceis, fol. lanceolatis repandis 5-costatis plicatis, *subsessilibus.* Racemis terminalibus radicalibusque nutantibus paucifloris, foliis brevioribus. Bracteis deciduo-persistentibus, sepalis basi saccatis! labello basi bisaccati, lobo medio bilobo, lateralibus subæquante.

4. *Cœlogyne Wallichiana* Lindl.

Pseudobulbis carnosis, cuti teneræ viridescenti purpureo-maculati, breviter cylindricæ, apice truncatæ, medioque conum obtusum gerente.

Flores radicales solitarii rarius bini, pedicello ovarium excedente, a medio infra bracteis carnosis, vaginantibus verrucosus, fusco-brunneis, verrucis viridescentibus, tecte, supra nudo. Ovarium in ejus apice articulatum tortum glabrum.

Sepala linearia, repanda reflexa, crystallina purpurea 2½ lineas longa, acutiuscula, lateralia basi paulo obliqua discreta, gibbosa.

Petala longitudine eadem linearia angustissima reflexa.

Labellum cucullatum, supra columnam convolutam, margine sinistra, (looking at the back of the flower) superiore, lobis lateralibus obsoletis, terminali bilobum, sinu mucronatum gerente, denticulato-fimbriatum basi in calcar brevissimum album product. purpureo rosaceum, cristis pectinatis 5, quorum 2 lateralis utrinque ad basin lobo medio desinunt, medio primo obsoleto, ad mucronem fere current. apicem versus ut etiam labelli partibus contiguis luteis.

Columna clavata semiteres, gracillima, apice curvata deorsum alato, profunde emarginato; lobis, deflexis, lateraliter patens.

Rostellum deorsum currens maximum, latitudine columnæ apicis baseos. Stigmatis margine infero, in apiculum insuper columna applicit product.

Anth. terminalis dente postica infra emarginationem columnæ apicis exsertâ, affixa, cristatâ, crista postica in conum prominulum cujus apice affixa est anthera desinens, bilocularis. Pollinia 4 incumbentia oblonga ope materia pulverea parum. viscida glandulam mentient per paria affixa obovata, faciebus approximatis complanata.

HAB. In rupibus, *Churra: October* 18*th*, 1837. Assam Herb. 162.

Species per pulchra.

Habenariæ sp.

Terrestris erecte 1½ pedalis, vaginis folior. arctis longiusculis, foliis oblongo-lanceolatis subacuminatis, carnosis 1-veniis, summis spicam infraque ad vaginas laxas acuminatas reductis. Spica terminalis pauciflora. Bracteis linearibus acuminatis ovarii longitudine.

Flores resupinati majusculi inconspicui albi inodori.

Sepal posticum galeatum, sub 5 nerva distinct 3-nerva, lateralibus 5-nervis, reflexis ovatis conforme sed minus.

Pet. linearia uninervia, directione sepali postici. Labellum late cuneatum, obcordatumve ; lamina nempe, transverse oblonga, 3-lobo, lobo medio angustissimo integerrimo, lateralibus dentatis breviter quasi unguiculatum est, calcare bi-unciali laminam aliquoties superante, clavato obtuso medium paulo super geniculato !

Columne ante antheras vix producta, processubus viscidis subulatis binis deorsum spectantibus, 1-nempe utrinque caudicula opposit. o, antheræ loculi discreti, caudiculis brevibus, glandulis nempe ultra antheras nec elevatis. Stigma planum (cavitato id pone sitâ) hinc utrinque uti processum aucta.

Hab. Legi in sylva *Mowgong*: *November* 18*th*, 1835. Assam Herb. 278.

Description of Plate CCCLI. A.

1. *Oberonia trilobata.* Clinandrium and Pollinia in situ.
2. *Cœlogyne maculata* Lind. Pollinia and gland.
3. *Microstylis,* sp. 1 p. 271 column and pollinia of.
4. *Eria Lindleyana* pollinia, parts of the flower *&c.*
5. *Bolbophyllum reptans,* Pollinia.
6. Liparis, *sp.* 1, p. 399. Assam Herb. 296. Pollinia.
7. *Cymbidium densiflorum,* Pollinia and gland.
8. *Dendrobium eriæflorum,* Pollinia of.
9. *Oberonia iridifolia* Lindl. Pollinia &c.
10. *Bolbophyllum cylindricum,* Pollinia of.

11. *Eria cylindripoda*, p. 299 Pollinia, &c.
12. *Eria flava*, p. 301, Pollinia &c.
13. *Oberonia anthropophora*, p. 272, Pollinia.
14. *Liparis luteola*, p. 277, Pollinia of.
15, 16. *Cirrhopetali, sp.* 2, p. 295, *Assam Herb.* 183, Column Pollinia &c.
17. *Cirrhopetali*, sp. 2, p. 295, Pollinia, column and section of the flower &c.
19. *Bolbophyllum Khasyanum*, p. 284, Pollinia.
21. *Aclinia sp.* p. 321, Column Rostellum and Pollinia.
22. *Conchidium pusilium*, p. 321, Pollinia.
23. *Cœlogyne barbata*, p. 280, Pollinia.
24. *Dendrobium amplum* Lind., sp. 3, p. 309, *Khasyah Herb.* 168. Pollinia and section of anther, anticous wall or incumbent face removed to shew the septa.
25. *Cymbidium gigantium*, p. 342.
26. *Dendrobium, sp.* D. pygmeo affine no. 9, p. 314, Column, per. abbreviata. Mergue Herb. 808.
28. *Arundina affinis*, p. 330, Pollinia and clinandrium of.
29. *Cymbidium syringodorum*, p. 338, Assam Herb. 228, Pollinia.
30. *Cœlogyne trisaccata*, p. 400. Pollinia.

Description of Plate CCCLI. B.

1. *Spathoglotis Khasyana*, p. 323, Pollinia &c.
2. *Anthogonii*, sp. p. 383, *Assam Herb.* 163, Pollinia &c.
3. *Calanthe gracilis*, p. 367, Column, Pollinia gland &c.
4. *Cœlogyne Wallichiana* Lind., p. 402, Pollinia.
5. *Saccolabium carinatum*, p. 354, Pollinia.
6. *Cymbidium carnosum*, p. 339, Pollinia.
7. *Goodyera affinis*, p. 391, Pollinia section of alabastrum &c.
8. *Sarcanthus guttatus*, p. 364. Pollinia.
9. *Goodyeræ* sp. 9, p. 393, *Assam Herb.* 179. Pollinia.
10. *Vanda cærulescens*, p. 352, Pollinia.

11. *Saccolabium calceolare*, p. 356, Pollinia.
12. *Saccolabii*, sp. 4, p. 357, *Khasyah Herb*. 152, Pollinia.
13. *Cleistoma*, sp. p. 357. Pollinia.
14. *Eulophia*, sp. 2, p. 350, Pollinia.
15. *Goodyeræ*, sp. 1, p. 387.
16. *Dendrobium* flexuosum, p. 317.
17. *Cymbidium fuscescens*. sp. 8, p. 343.
18. *Habenaria marginata*. Situation and alternation of parts of the flower, 1 sepal, anther and stigma, 2 and 5 Petals and stamina, 3 and 4 sepals and stigmata.

Pl. CCCXXVIII.

Fig. 1. Dipodous genus *sine charac*. From the Mishmee Mounts.

[Leaves lively green, scape fuscous below on the efloriferous part becoming purple at the floriferous part and green at the apex of the newer parts. Bracts whitish purple-veined. Lateral sepals white in the middle, with greenish margins, the white parts veined with purple. Petals purple and sanguinous. Pollinia light yellow. Bulb. shrivelled.

Fig. 2. *Sine charactere*. From the Mishmee Mts.

Bulbs shining 4-angular, sheaths tinged with brown leaves, lively green, ovary yellowish green. Petals and sepals white. Labellum white, lateral labell. towards the point yellow, the rest fuscous veined and tinged on the middle lobe with a large yellow ovata spot on the centre, apex and fuscous margins of the labellum orange.]

Pl. CCCXXVII.

Fig. 1. Dipodous genus. From trees on Thumathya in the Mishmee Mounts *sine charac*.

[Obs. no plant is more calculated to shew that the pseudobulbs are due to metamorphoses of the petioles than this, *k* old bulb., *f* scape, *h*, *i* new bulbs, *g* old bulb.

The peduncles of this plant are light yellowish green, ovary green, bulbs blackish; that opposite to the posticous sepal broad.

Sepals and petals light fuscous, veined with bright purple. Labellum the same, but less veined, apex linguiform, fuscous green colour, light fuscous green on the sides, margins purplish. Pollinia 4, collateralia, gland 2, *a* bright green, *b* whitish green, *e* fuscous green, *d* fuscous brown, *c* membranous, surface cinereous, upper whitish.]

Fig. 2. Dipodium Khasyanum, p. 354.

Pl. CCCXXIX.

Dipodous genus from Dilling in the Mishmee Mountains. *Sine charactere.*

[Rhizome dull green with brown scaly stipules. Leaves bright green, above the under surface subglaucous with prominent yellow plica at the base, about seven plicæ to each. Petals and sepals white. Labellum white, its sigmoid base fuscous orange, column coloured like the labellum.

Pollinia incumbentia 4, per paria caudicula pulvereis longissimis.]

Pl. CCC. Fig. I.

Ditto do. Also from the Mishmee Mounts, near Ghalooms. *Sine charactere.*

[Leaves coriaceous upper surface dark green, under glaucous. Sepals white. Petals do. lined from below the middle with purple. Labellum lateral lobes purple in irregular patches. Anth. yellowish. Column anticously spotted with brownish purple. Rachis florifere flattened.

Base of the Rhizome covered with fibrous sheaths.]

Pl. CCCXL.

Habenaria, sp. *Itinerary Notes*, p. 31, no. 494.

Pl. CCCXLVI. Fig. II.

Epipactis. From Affganisthan.

1. Alabastrum, 1 lateral sepal and a petal removed.
2. Column front view.
3. Do. side view, *a*, *a* represent abortive anthers ?

4. Back view of column.
5. Front view of anther. Pollen removed.
6. Grains of pollen.

Through this, Orchideæ revert to the ordinary structure, and still more through Apósticæ in one species of which, the last remaining orchedeous symptom viz 3-4 nary aggregation of pollen granuls disappears.

'In natura rerum ita est, ita fuit, ita fuerit, ut nullum characterem, sine exceptionem esse, quonium natura non facit saltus.'

Do. the roundish prominent masses on the lower side of the stigma represent the two lateral stigmata? in situation they are proped.

The true relative position of the lateral processes of the column has been stupidly omitted by me in this drawing.

Compare it with Bauer's drawing of Epipactis, does Epipactis differ (in its species) in the direction of development, are its lateral processes always oppossed to the lateral petal, or are they occasionally opposed to these, occasionally to the lateral sepals, see Bauer, 6-10: the lateral teeth of sketch 6 obviously being those which in 10 bear the anther.

MUSACEÆ.

MUSA.

Musæ sp.

Flores spathacei, spatha monophylla, per totam longitudinem rumpens. Flores semi-verticillati duplici ordine dispositis breviter pedicellati semiverticillati, bractea maxima, oblonga colorata suffulti.

Perianth. superum, bilabiatum, labio superne longiore, apice inæqualibus 5-dentato, dentibus lateralibus dorso processum subulatum gerentibus.

Inferiore *interiore* concavum integrum acutum.

Stam. 5 sterilia labio superior opposita.

Filamenta complanata, stylus longus cylindricus sulcatus stigma capitata, apex cellulis elongatissimis tecta materia grumosa globulosa dense interspersa.

Ovarium inferum, angulatum, 3-loculare, ovulis oo placentis axilibus affixa, ovula pulpa immersa, pulpa ecellulis elongatis obtusis laxis formato.

MARANTACEÆ.

PHRYNIUM.

1. *Phrynii* sp.

Caulis teres adpressa sericeo, pilosus apice ad capitat. dorsi unifolios.

Petiolus pedalis vel ultra basin tantum canaliculato-marginata vaginaris cæterum teres. Lamina oblongo-elliptica cuspida lata acuta breve, basi quasi cucullata, (or rather scouped out) subtus glauca venis viridibus pulchre lineata, eo costem pilosa.

Flor. non visa.

Fructus dense capitat. capitulo nutant. or horizontal bracteis foliaceis apice sphacelatis paleisque nigrescent. immixtis, clavata trigoni-obtusa apice calyce ad basin fere in lacineas 3, lineari-setaceas coronata puberulus breviter pedicellat. 3-locularis, 3-spermus. Epicarpio coriaceo cartilag. *odor felicinus*, loculis angulis oppositis, endocarpio celluso albo.

Lamina erecta oblonga subparallelegramica aspectu cartilag. basi arillat. immature, raphe ½ complete nearly in the centre and close to an oblong obclavate cavity. If the seeds are uncinate to this, it must be from the inner situation of the raphe.

2. *Phrynium spicatum.*

Caules foliiferi compressi pluri folii. Petioli e basi vaginant longe (3-4 ped.) teretes, lamina bipedalia fere oblonga,

basi leviter decurrens, venis oblique arcuatis subtus glauco-albidis striatis.

Scapi radicalis vix ultra pedales (rhizomat.) Pedunculi bracteis 1-3, albis, scarioso-membranaceis laxis sursum majorifactis reconditis.

Spica florifer basi bractea subfoliacea oblonga apice non recurva vacua, accedunt. bracteæ bifariæ, apice rotundatæ recurvæ, floriferæ more Curcumæ.

Flores aggregati per paria in sinu bracteoli albi membranaceæ in sinu bracteæ reconditæ breviter pedicellati.

Calyces laciniæ albæ angustæ lineares tubo ⅔ breviores.

Tubus angustus cylindraceus, bracteæ os subæquans,

Per. exterius, tripartitum basi infundibuliformum lacinis lateralibus revoluto-reflexis, postico erecto-oblongis.

Interius irregulare lob. 2 majoribus concavis venosis: 1-lateral, 1-antica, 2-minor, magis carnosis concavis apicibus luteis, laterali præcedentibus altera, cum anthera connata, altero inter segment. per. internum anticum et laterali extrors.

Filam ? dilatatum rotundato-obtusum, posticum lateri sinistro (looking at the flower from the front.) Anther filam. libero brevi, loculo uno pollinifero longit. dehiscente, altero petaloideo more supra dicto connato, between its base and the concave back it is increased by a tooth.

Stylus lutescens, curvato robusto connato cum tubo perianth. Stigma convex fere deorsum geniculata.

Ovarium 3-loculare, loculis medio ovulatis, ovul. o erectis solitariis, raphe next the axis.

Hab. Malacca in dense wet jungles at Ching.

From this it would seem that the right lateral segment of the inner perianth is wanting, that the left lateral stamen is 1-locular, the right petaloid, and the posticous fleshy-petaloid.

So that this is a very complex plant indeed.

It appears to be a Phrynium, (*P. spicatum*) but certainly does not cerrespond with the character in Endlicher, and I think it likely that the same importance is to be attached to the inflorescence in this family as in Scitamineæ.

Radical, and caulescent inflorescence appear to me of paramount importance.

The fondness of these plants for collecting water is not a little remarkable; in this species and in some others the alabastra must be often quite immersed.

The *vaccuous* basilar bracte is decidedly worthy of notice.

Canna.

Canneæ sp.

Inflorescentia paniculato-spicata, spicis secundis paucifloris bractea membranacea, lanceolata convoluta suffulta.

Calyx 3-partitis sepalis 2 superior majoribus, antico minore.

Corola 3-partita, subæqualiter, laciniis inflèxis? labellum posticum cucullatum basi carnosa subinvoluta genitalia obcludente, limbo membranaceo cordato emarginato bifidove.

Filam. petaloideum bilamillosum, lamina interior minora, 2-loba, exterior membrana producta, latere antherifera. Anth. breviter pedicellata, 1-locularis, lateri interior pedicelli sita. Pollen globosum læve.

Stylus curvato declinatus stigma vix terminati ovatum, concavum.

Ovarium 3-loculare, 3 ovulatum, ovulis 2 cito abortientibus, demum baccatum? ovula basi affixa.

Spica centralis, nempe foliorum vaginis amplexa. Rhizomato repente. Pseudo-caulis subancipitis, foliis longe petiolatis, petiola superne terete, floribus albis. Spec. unicum vidi, cum folia nulla.

Hab. In sylva adviam, Mergui: *September*, 1834.

SCITAMINEÆ.

General Remarks.

Among those Scitamineous plants that would (if verbal characters were merely looked at,) be included in Alpinia, I find three modifications of form.

The first, in which the flowers terminate the leaf-bearing stem, and which have a peculiar habit, the lip of the flowers being scarcely at all lengthened out. These I imagine will still be called Alpinia, and will include A. allughas, galanga, nutans, capitellata etc. etc.

The second, and third have the flowers on *radical* highly bracteate scapes, the flowers are in every respect elongated, and have the like affinity with ordinary forms of genuine Alpinia.

The second of these groups, remarkable for its generally extended laballum, and its unilabiate flowers, the laciniæ of the outer series being short and incumbent to the filament or the tube formed by its union with the labellum, I propose calling ACHASMA, in allusion to its having no rictus between the anterior and posterior series of the perianth.

The third in contradistinction I call STENOCHASMA, the segments of the outer perianth being prolonged into a posterior lip. The labellum too, while its lateral lobes approximate to those of Achasma, has its central lobe of the same length with the stamen, and is concave.

To Achasma will belong A. macrocheilos, A. megalocheilos, A. metriocheilos and A. elatius (microcheilos) or Alpinia elatior of Jack.

To Stenochasma belong two species S. urceolare, and S. convolutum.

The Achasma section approaches nearest to Alpinia, the anthers generally assuming that form, and being smoothish or smooth.

The genuine Alpiniæ, have the labellum more or less explanatum, rarely embracing or supposite to the column, the base of the labellum is bicallous the anther deeply bilobed.

The stigma occupies the apex of the style.

The filament has several vascular fascicles, the anther 4 or 3.

Genuine Alpinia also appear to differ in the ovula which during inflorescence, have a very wide foramen, no arillus, and are of small size, some have definite ovula, the perianth is bilabiate, the coats short.

Zingiber.

I. *Zingiber* sp. Pl. CCCLI.

Vaginis striatis compressis, fere ancipitibus, foliisque subtus pubescent. ligula membranacea integra tenuissima, petiolis basi carnosus brevis, lamina lanceolato-acuminata.

Scapus rotundato-clavatus, apice florifera, mucilagina aquosa repleta, bracteis omnino vestitis.

Bracteæ inflorescent late rotundatæ concavæ, margines subincurvæ membranæ pubescenti.

Bracteola (e 2 connat.) membrana laxa mucilagine repleta.

Flores solitarii mediocres ochroleuca calyx tenuissimis membranaceis.

Per. ext. lacin. subæqual. concavo-involutæ, acutæ patente ascendent.

Tubus curvatus infundibul. *bract.* $\frac{1}{3}$ longior.

Labellum 3-lobum, lobis lateralibus ascendentibus, oblongis, centrali bifido basi carnosa, gibbæ antheræ applicit. cæterum petaloid. venosum cito marcescens, marginibus quasi undulatis. Filam. liberum brevissimum.

Anthera in labello decumbens rostro incurvo, stylus apice infundibuliforme margine hispido.

Ovar. 3-loculare, ovula plura angulis centrali affixa, arillo hinc collo foraminigero perforat.

Stam. sterilea discreta, stylum non amplectentum tubo perianth crasso carnoso.

HAB. Malacca at Pungitt maj. Leaf stems 2, 3 feet, flowering, spithamæal.

OBS. These Gingers are regular fountains of water or mucilage.

Anth. with 3 vascular fascicles, central smallest, lateral not central with regard to the axis of each loculus, outer coat of pollen with areolæ.

2. *Zingiber spectabile.*

Fol. bifariis vaginis fissis, ligulis integris rotundatis *membranaceis.*

Lamina subsessilia, lineari-lanceolata acuminata, glaucescenti-viridia, subtus pilis logis sparsis adpressis.

Scapo complete vaginato, 1½ pedale resembling at the flowering part an open pine cone, pars florifere spithamæa, ovato-oblonga.

Bracteæ magnæ rotundatæ rufo-badiæ margine apicis involuta? and so all have a rimmed appearance, I have not seen the flowers, but they appear to be solitary, their remains are enveloped in a convolute posticous acute bract.

This is a natural fountain also.

The fruits are sessile, backed by the now expanded flower except at the apex where there is a convolute reddish bract, mucilaginous outer surface compressed oblong, lateribus secus longit. totam dehiscens, valva antica demum bipartib. Semina 2-3 seriate atro-nitida, arillo albo, apice 3-5 partito aspectu celluloso fere omnino inclus.

HAB. Malacca near Verupha.

CURCUMA.

1. *Curcuma.*

Scapis infra vaginatis, supra subfoliosis! folia lanceolata, centro sanguineo rubro picto.

Pars florifero oblongo cylindrice, bracteis conduplicato-convolutis undique tectus, quarum superi tantum lamina elongata petaloidia, apice planiuscula, gaudent.

Bracteis oblongis, where they spread out from the stem as if pinched inward so that the margins there are more approximate.

Calyx brevis subcylindraceus ore postice fisso, obsolete 3-dentata purpurascentio-rubra.

Perianthium tubus infundibuliforme. Exterius e lacinus tubus subæqualibus, postico cornigero mucronato concavo albido.

Interioris laxa, lateralibus subparallelogram, apice rotundatis albidis.

Intermedio labelliforme subtrilobo, lobo centrali bifido, fundo luteo transverso rugoso.

Filam. breve dilatatum albidum, anth. *inclinata* inferne subloculum quemque calcarte. Style apex dilatated viewed vertically sub 4-gonal. Stigma a transverse chink near its lower edge.

Per. when marcescent has the tube spirally involute; as in Hitchinia there are several flowers in each axilla of various developments.

Ovarium 3-locular, ovules many, attached to the inner angles.

Ovules basilar with a dentate edge.

HAB. Malacca near Verupha.

2. *Curcuma.*

Radix fibrosa. Caulis spurius foliis vaginantibus. Rhizomata subterranea, gracilis, squamis cordatis gerentia.

Fol. radicalia exteriore 1-1½ pedalia, interiora 3-4 pedalia, longe petiolata, elliptico-ovata utrinque attenuata, repanda, superne ad venas pilosa, utrinque sed præsertim subtus minute papillosa, viridia, subtus pallidiora, venis secondariis acutangularibus. Petioli canaliculati, a basibus paullo ultra medium marginata.

Scapus centralis, inferne foliis vaginantibus obtectus, coma maxima clavata terminatus. Bracteæ maximæ, inferiores viridi, purpureæ late spathulatæ, superiores rosaceæ angustiores latioresque, integerrimæ subreflexæ.

Flores 3-4 vel plures in unaquaque axilla, sessiles, bracteis membranaceis purpureo tinctis stipatæ, citrini, labello luteo.

Cal. tribulos breviter 3-dentat.

Cor. infundibul. subringens, tubo calyce fere 3-plo longiore, 3-partita lacinia superiore subcucullata mucronata. Labellum rotundatum reflexum emarginatum.

Filam. petaloid. 3-lobatum, lobis lateralibus tantum petaloid. oblongis, medio breviore plana subulato, antherifero. Anth. basi utrinque calcarate stylus filiformis in sulco filamento receptum superne, anthera amplexus, stigma infundibulif. corpora 2 sterilia oblonga, germini insident. Ovarium extus pilosum, 3-loculare polysperme.

Hab. Mergui etiam ecta, flores *Julio*, 1837.

3. *Curcuma montana*. Pl. CCCLII. Fig. 1.

Cal. tubulosus, 3-dentatus velutinus. Cor. perigyna infundibuliformis, tubus gracilis pauce pilosâ, 3-partita, laciniis sepalis alternantibus, ovatis, postica concava, (alba,) stam. petaloidea 3-petalis alternantibus, 2 lateralia minora, 1-anticum majus labelliforme, bipartitum repandum, stam. fertile 1, inter 2 petaloidea lateralia et iis adnatam, ideo labello oppositum.

Filam. planum ovatum, anthera bilocularis in loculis discretis subdistantibus, connectivum magno inferne in calcaribus duobus producta.

Ovarium pilosum, 3-loculare, placentis axillibus pluri-ovulatis, ovulis erectis, funiculo ad hilum incrassato.

Stylus longus filiformus, stigma cyathiforme ex anthera insidens. Stamina 2 abortientia, inclusa stipitata glanduliformia, styli basi adnata, anthera fertile alternantia. Pollen globosum læve.

Hab. In montosis humidis prope Vellore, Augt. 1837. Acaulis Folia ovato-lanceolata acuta. Spica ante folia floret. bracteæ juniores erectæ purpureo rosaceæ, seniores reflexæ virescentes, omnes repandæ. Filam. petaloidia lutea. Flores 2 in axilla ejusque bractea.

Curcuma montana.

1. Flower.
2. Do. opened.
3. Anther, style and stigma in situ.
4. Do. style and stigma removed.
5. Do. back view.
6. Pollen.

7, 8 Portions of the style, and stigma.

9. Vertical section of the ovarium.

Hab. *Vellore, August*, 1833.

4. *Curcuma.*

Scapo clavato, vaginis tecto. Bracteis inferioribus foliaceis, repandis, superior petaloideis, rosaceis, floribus in harum axillis aggregatis inconspicuis, albis luteo-tinctis, bracteis proprius membranaceis.

Cal. tubulosus obsolete 3-dentatus, interior laciniæ lanceolati postico majoræ, apice *cucullato* subulato.

Pet. 2 lateralalia oblonga, filamento bases versus marginem interiore adnat.

Labell. obsoleti 3-lobum lutescens. Anth. simplex, 2-calcarato, calcare utroque basi antice gibberem gerente.

Hab. Mergue Biklower in sylvis, Fol. o. *March* 1835. no. 1082.

5. *Curcuma.*

Scapis clavatis 1-2 pedalibus, bracteis convolutis amplexicaulibus vestitis apice versus floriferiis. Bracteis maximis,

inferior rotundatis, repandis foliaceis, summis, oblongis pulchre rosaceis, floribus inconspicuis in axillis bractearam sessilibus fasciculatisque, bracteolis membranaceis albis, ovario pubescente.

Calyce 3-dentato, obconico.

Cor. subinfundibuliform, laciniæ 3 exteriore, erectæ subconnivent. postico subcucullato, apiculo subulato, albido 3 interiores minus profundiæ, lateralibus oblongæ, erectæ albæ, antica (labellum) erecta oblonga, obsolete 3-loba, lobo medio aureo emarginato, lineæ 2 planiuscule lutescentis currentis a basi hujus lobi ad basin corollæ.

Anth. simplex. Filam. breve complanatum, connectivo deorsum in calcaribus 2 longis product. Gibbere uno, obtuso ad basin cujusque calcaris, *superne*.

Stigma subbilabiata subinfundibuliforma labio superior *deflexo*. Ovar. 3-locul.

Folia ovato-lanceolata acuminata medium versus sæpius purpurascentia.

C. zedoariæ, proxima.

In graminosis umbrosis sylvisque, circa Merguium, vulgata, *April*, 1835. *Mergue Herb*. 1118.

AMOMUM.

1. *Amomum*.

Caules foliosi 2-2½ pedales infra medium tantum vaginis instruct. supra bifarium folios. vagin. oribus obliquis ciliatis ligula integra.

Petiola libera vix uncialis canaliculata. Fol. oblongo-lanceolata, hinc illinc repanda, subtus molliter pubescentia, superiora in caudam tenuum subito attenuata.

Rhizomata subterran. longe repent. inflorescentia e rhizom. laxe spicata, spicis brevibus 1-2 floris, more solito bracteis but few in number. Spicis pluribus alternis.

Bracteæ puberulæ conduplicatæ acutæ interiores majores, rubescenteque. Bract. vagin. membrana ore obliquo aperta, flor. basi cingit ovario 2-3 plo excedens.

Calyx subinfundibul. infra medium gracilis, bipartitis lacinia alter. bifida.

Per. exter. tubo calycis longitudine gracil. laciniis 3, oblongis obtusis tertio (postico) majora.

Labellum post anthesin arcte involutum marscescens maximum subcochleatum.

Filamentum concavum dilatatum intus pubescens. Anth. magna loculis distantibus (stylo interjecto connectivo postice in laminam latam product. triloba, lobo medio majora) quam stigma recumbent.

The stigma or apex of the style is very large bell-shaped, with a ciliate edge insidens to the stigma, the style is suddenly contracted into a fine filiform shape, exactly enough representing one of the bell-polypes.

Ovarium hispidum dense 3-loculare, loculis pluri-ovulatis.

Stam. sterilia lateri uno alte coalita, ochroleuca.

It would appear to be an Amomum of Endlicher's Genera Plantarum, but the genera of this family are not precisely discriminated.

The anther is really didymous, I see no processes at its base.

Lip in æstivation with the one side rolled and the other overlapping it, the central plaited part incurved, it is subbilobed with a whitish fundus, fleshy, as it were bigibbus, and pubescent, lobes of anther or connectivo parallelogramic erect, central twice larger, filament very short.

Odour when fresh bruised, pleasant, that of the marcescent parts unpleasant.

Hab. Malacca at Phinghull Malim.

Obs. Sp. perpulchra aromatic somewhat like fresh pepper.

It agrees with the character of Alpinia in Endl. Genera, but its habit is quite different, Endl. sections are here very ill distinguished.

Can it be Alpinia magnifica, Phænomeria of Lindley.

ELATERIA.

Elateriæ sp. Pl. CCCLII. Fig. II.

HEDYCHIUM.

Hedychium.

Rhizomata repentibus, tuberos arcte approximato, l-lateralis gerentibus, caulibus compressus, foliis elongato-lanceola-acuminatis, repandis glabris, floribus racemosis, perianth externo lineari-convoluto, viridi, inter labell. bilobo alba.

Filam. ochrolcucum, anth. aurantiacea. Racemis terminalibus abbreviatis paucifloris (3-4) foliis multo brevioribus, flores vix odorat.

HAB. Mergue in arbore. Platoon Insula Madamaca, *August*, 1834. Mergue Herb. 105.

Hedychium.

4-5 pedalis, foliis 1½ pedalibus lineari-lanceolatis acuminatis, subtus vaginisque apices versus pilosis.

Spica terminalia bracteis maximis foliaceis, ovatis venosis, floribus 2-3 in cuique axilla, maximis albis, odoratis, tubo longissimo. Petalis 2, interior obovatis labello obcordato, bilobo, anthera alba.

HAB. In aquosis. Mergue: *July, August*, 1834. *Mergue Herb.* 195.

Hedychium Gardnerianum.

Stamina lateralia interne ordinis non etiam in statu rudimentaria adsunt nisi labellum ex uno stamine, seriei externæ duobusque, seriei interne exstructur. In hoc casu stamen externæ seriei parte media incolorata unguis labell. imitatur, stamina lateraliæ seriei internæ partes laterales colaratæ. Pars incolorata ut decet petalorum segmentes alternatur, partes coloratæ petalorum segmentis oppositæ sunt corroboratur labello internum 3 lobo.

H. Comit Vandes, *Sept.* 21*st.* 1831.

Alpinia.

1. *Alpinia carnea.*

Glabra, ligulis mediocribus. Fol. coriaceis oblongis, basi ovatis vel subcordatis acuminatis.

Panicula terminali ovata ramis oppositis subbracteatis brevibus 3-5 floris, bracteis inconspicuis.

Flores in pedicelli albidos, apices articula parvi ascendentis, albi labello lilacino tincto.

Ovar. ovatum glaberrum nitens. Cal. subinfundibulif., ad apicem ovarium construct, irregulariter 3-dentato subspathaceo.

Per. exterior reflexi, laciniæ oblongæ subæquales, (ob dispositionem sepal. lacinear lateratum subbilabiatum est perianth.) laciniis emarginatis, postico concavo.

Labellum oblique patente porrectum parvum oblongum, basi canaliculatum medium versus utrinque 1-dentata lobo centrali ad basin bilobum.

Dens callosa, fucescens utrinque basis labell.

Filam. planiusculum carneum, suberectum space between the anther cells and apex, occupied by a membranous fleshy expansion quite entire.

Stylus apice infundibulif., stigma an open chink or orifice in its vertex.

Ovarium 3-loculare, walls substantial cells of the size of the ovula, which are two in number in each, attached to the centre of the septa or placentæ.

Fructus non visus.

The upper ovule has its foramen downwards, the lower one has it obliquely upwards.

Stamen shortish white with the upper edge subdentate anteriorly entirely connate.

This shews that in Alpinia there is no dependance to be placed or the connected integrity or division, and further, it shews that in Stenochasma and Achasma, the same may hold good.

That these Alpiniæ are of a distinct type, I have no doubt, their habit is very different, the flowers are articulated on the pedicels, the calyx and indeed the whole flower is shortened, the labellum is not supposite subfilament, the perianth is patent, and above all, the ovula are definite.

To this head will belong, A. cochlearis, Allughas and Galanga.

To a second, A. nutans, Malaccensis, altera Ophirensis.

2. *Alpinia cristata* Gr.

Caulibus foliosis florigeris, 3-5 pedalis.

Panicula pubescens terminali erecta conica, fl. inferioris racemosis, superioris solitariis, basi bracteis 3-5, lanceolato-oblongis ascendentibus, quarum longioris panicula $\frac{1}{3}$ brevior stipata.

Racemis 2-3 floris, basi bractea oblonga suffult. accedit, bractea involucrata connata, ore truncato, pedicellos recondent, si flores 2, adsunt pedicellus unius nudus, secunda bracteola involucrant. pedicello brevior.

Ovar. dense pubescens, calyx subcylindraceus venosus, ore late 3-dentato.

Tubus per. Corollæ gracilis calycem paullo excedens.

Per. exter. c sepalis 3-*tiis* erectiusculis, laterali obovato-oblongis, postico latiore, apice cucullato calcarato.

Labellum cucullatum cochleariform. fere conduplicat. ratione floris amplissimo, margine dentato basi processubus 2 dentiformibus. Color. aureum sanguineo-venosum process. laterali sanguinea.

Filam. aureum deorsum curvat. anth. pubescens, margo superus cristat. utrinque dentatus stigmatis margine denticulato setoso, staminoid brevia robusta discreta. ovarium triloculare the placentæ just meeting in the axis, ovulis pluribus.

Fol. oblique subdistichis 1-2 repandis, subtus mollibus, venis 2, basi exceptis indistinctis.

Hab. Malacca. In sylvis densissima humida inter Asuhum et Gummy.

Alpinia, fol. subtus mollibus venis indistinctis, panicula pubescent (conica) erecta. Bracteis general. 5 ascendentibus partialibus involucrantibus, floribus subnutantibus sepalo tertio calcarato cucullato. Labello (maximo) indiviso conduplicato cucullato maxime dentato, anthera pubescent margine supero crista transverse denticulata.

Rather a handsome species.

3. *Alpinia Allughas.*

Inflorescentia paniculato-racemosa, racemis paucifloris basi bracteis 2, minutis stipatis. Bracteola membranacea, satis magna ad basin cujusque floris.

Cal. postica bidentatus, antica integer.

Cor. tubus calyce paulo longior 3-partitus, petalo postico paulo majore libero, lateralia bases versus margine antica, (inferior) labello adnatis.

Labellum petalis vix majus, 3-lobat. lobis lateralib. stam. abortient lineari-subulata basi calloso-glandulosis, lobo medio obovato emarginato, denticulato.

Filam. breve planum. Anth. simplice connectivo carnoso ultra anther non producto.

Stylus filiformis, basi conicus, angulatiusque stigma capitato cyathiforme. Ovarium 3-loculare. Glandulæ epigynæ 2 emarginatæ lividæ, petalis opposita.

Pet. fusco viridestentia. Labellum albidum striis lateralibus purpureis, lobis lateralib. purpureo maculatis. Filam viridiusculum connectivum luteum. Glandula lobo lateralia brunnea.

Hab. Mergue Herb. 168.

Planta non dum visa, Paniculæ tantum mihi allatæ, Mergui: *August*, 1834.

4. *Alpinia involucata* Gr.

Elata, ligula oblonga (solito major.) margine ciliato.

Fol. elongato-lanceolata bipedalia subtus velutina, mollissima tactu supra præsertim costam versus pluricarinatula.

Panicula terminali nutante purpurascens coarctata.

Bracteis communibus 3-4 scariosis scaphiformibus, throw back on the *upper side* or *sursum secundis* partialibus (racemorum) oblongis concavis.

Racemi apice pluriflori, congestum, flores subsecundi, quisque cinctus bractea circulari involucrant. interdum alba, petaloidea.

Flores ampli.

Cal. pressione angulat. ore subtruncatis. Per. exter. folia deo-carnos. laciniis lateralibus minoribus omnibus cucullatis cuculis posticis interdum calcaratis.

Labellum calceolare cucullatum integrum marginibus tenuiter fimbriato denticulato albis, cæterum aureum, venis fundo sanguineis processubus lateralibus dentiformibus sanguineis obsoletis ?

Stamen pubescent velutin. Anth. profunde biloba, simplex. Staminoid discreta. Stylo basin involvent.

Fructibus ovato-rotundatis size of a gooseberry, calyce coriaceo scarioso subsiccis, velutino pubescent.

Loculis (siccatato) decendentibus in corpis libera trisulcatum membrana alba vestita.

Semen cuique loculo 00.

Hab. Malacca at Ayer Punnus, near Rhim.

A very distinct species. Not distant from Alpinia nutans.

Caule folioso florigero, (alto) foliis subtus velutinis tactu mollibus panicula coarctata, nutante subsecunda. Bracteis generalibus magnis scaphiformis ultimis petaloideis flores involucratantibus, anthera pubescente, labello indiviso cochleariform.

5. *Alpinia viridiflora* Gr. Pl. CCCLIII.

Species ampla, 6-pedalis, foliis sesquipedalibus carinatis, deorsum arcuatis, leviter subrepandis. The usual liguliform *process* being present.

Panicula thyrsoidea ampla erminalis erecta.

Racemis paucifloris, floribus secundis ascendentibus, odoratis quoque 1-bracteato, bractea alba carinata, cito sphacelata. Alabastra perianth saturate viridia. Pedicelli ⅓ uncialis.

Calyx albus subcylindraceus interne breviter spathaceim fissus, externe 3-dentatus.

Corollæ tubus calycem paullo excedens, lacinia postica directione fere calyces vel ascendens spathulato-concavum, apice cochleatum, laterales oblique reflexæ obtusæ planiusculæ vel marginibus involutis.

Labellum unguiculatum, lamina biloba, lobis suberectis margine denticulatis, album, venulis sæpe irregulariter, lilacinis, ad basin glandulæ duæ oblique sausage-shaped, rubræ.

Filam. angustum simplex, apice subgeniculato cæterum directione petala postico, connectivum emarginatum.

Stylus filamento applicitus sursum circumvolate connectivo loculisque antheræ, apicem clavato-capitatum.

Stigma terminali, margine pilis ciliatum.

Ovarium 3-loculare, septis medio ovuligeris, ovula 2 cuique loculo, altero ascendent, altero descendente.

Cæter. non dum visa.

HAB. Malacca.

The placentation is the same as in *A. elatior*. Jack with this exception that the central lobes of the transverse section of the placenta *do* meet in the axis.

It belongs to the same squad as a Allughus, and Conchigera, with which the ovula agree very strikingly. It is perhaps *A. galanga ?*.

1. Sepals.
2. Corol.
3. Outer lamina petaloid.
4. Stamina.
5. Ovarium.

} Alternation of parts legitimate.

6. *Alpinia conchigera* Gr. Pl. CCCLIV.

Ovarium ovato-globosum, triloculare loculis 2 ovulatis.

Calyx laxus submembranaceus tubulatus ore rotundatum subtrilobo obliquo.

Cor. tubus calyce paullo excedens, obconicus. Per. exterius 3-partitum, laciniis subsimilibus postico oblongo planiusculo reflexo vel patent. lateralia cordata saccato-concava, sublabellum porrect. membranaceo viridia.

Labellum trilobum carnosum, lobis lateralibus dentiformibus, centrale cochleat. margine denticulatis, the floor with transverse fleshy rugæ, of which the two hindmost ones where the style passes down are large and tooth-shaped.

Color. ochroleucus lobis lateral. intus chiefly blood coloured, rugis fundi sanguineo-punctulatis, lineis ejusdem. The colour is well pronounced chiefly along the vessels of the lamina, margo præcipue apices purpureo-sanguineo. Filam. ex appendiculato arcuata, connectivo crasso apice bilobo, loculis linearibus pollina albo.

Stylus secus filamentum ascendens, stigma paullo exsertim *flattened*, funnel-shaped, stam. sterilia 2, glanduliformia, ovula 2 cuique loculo, supero ascendente, infero descendente, arilla annuliformia ?

Hab. Malacca.

7. *Alpinia elatior.* Jack *mal. misc.* 2, *no.* VII.

Spica globoso-conica, longe pedunculata, pedunculo robusto cauliformi foliaceo bracteato.

Bracteæ capites inflorescentiæ numerosissimæ elongato-lanceolatæ vel lineari-lanceolatæ exterior majores reflexæ vel patentes, interior connivent. colorus pulchre rosaceus, albo-marginatus.

Flores numeros. singulus sessiles in axilla bractes $1\frac{1}{4}$ unciales vix ultra bracteas inserti, subcylindracei deorsum arcuatim.

Cal. *exterior* tubo mediocri spathacei fissus membranaceus, ovario non adnatus. Interior longitudinis fere corollæ, postica fissurus spathaceas, apice læte coccineo-roseas, antica bidentatus.

Per. exterioris laciniis lineares apice concavo-carinatæ

tubum subæquantes, color albid. apicibus coccineo-roseis.

Labellum slipper-shaped narrow circa basin intus pilosum filamentum etc. convolutum ad locum junctionis filamento utrinque 1-dentatum vel simplex, venosum, sanguineo-aurantiaceum margine albis.

Filamentum robustum simplex, connectivo emarginato. Anth. bilocularis intus pilosum.

Stylus superne circumdatus connectivo et loculis antheræ. Stigma antheram terminans, discoideo-capitata, margo anticus fissus stigmatosus.

Ovarium dense pilosum, 1-loculare! placentis tubus on a transverse section hastate, the lateral arms, bearing many ovula pedicellate the central running to the axis, *but not united*, folia etc. non visa.

HAB. In Horto *Malacca*: *January*, 1842.

ACHASMA.

1. *Achasma megalocheilos* Gr. Pl. CCCLV.

Scapus, 3-5 uncialis, bracteis cuspidata apiculatis striatis ciliatis laxe imbricatis.

Bracteolæ 2 connatæ, spathacei-fissæ bipartita, (laciniis lateralibus) tubum corollæ paullo breviores.

Calyx laxiusculus spathacei-fissus, tubum æquans labio acuta et anguste 3-fido postico vel antico.

Per. exterioris, laciniæ lineares oblongæ postico latiore in filam. recumbent. laterali angustis conniventibus apicibus lacinia postica subsuppositis.

Labellum maximum, ambitu 3-lobum cum filamento altiuscula connat. lobis lateralibus in antheram subcucullatis, 1-erect, 1-slightly incurved, but by no means incumbent, marginibus revolutis, centrali obovato minute undulato.

Filam. dilatat. (liberum mediocre) anth. magna subbiloba, dorso apice intra marginem cristatula, loculis deorsum conivent *glabris*.

Stylus filiformis apice dilatatus quasi carnosis, viewed vertically it is convexly trigonal, stigma, a ciliate chink on the anterior curved border.

Ovarium 3-loculare pubescens, ovulis oo minutis angulo centrali affixis.

Staminodia, oblonga mediocra discreta.

Æstivatio labelli marginibus lobi centralis (et omni parte centro carnoso excepto) arcte induplicata *incumbente.*

Axes foliiferi 12-16 pedales.

HAB. Ad margines sylvarum in *campulis* graminosis pedis montis Ophirensis florens Februario. Color. flor. viridia coccineus marginibus, aurantiacea.

As the specimens are withered in the spirits, I am not certain whether the labellum is ever as explanate as represented, trusting to memory it is not.

A. megalocheilos Gr.

Scapis oblongo-ovatis, bracteis laxis ciliatis (e coloratis.) Labello maximo,lobis lateralibus in antheram cucullatam suberectis, explanato, 3-lobo, lobo centrali obovato. Anthera magna, emarginata, imberbis. Calyce tubum corollæ æquanti.

OBS. This with Achasma elatior, (Alpinia Jack) A. macrocheilos, forms a genus, known by the elongated labellum, and generally the emarginate divaricate lobed anther.

The anthers of Alpinia even are liable to vary, here it is evident no great confidence can be placed on them. The number of flowers to each *bractea* requires examining.

2. *Achasma metriocheilos* Gr. Pl. CCCLVI.

Axis florifera radicalis, 4-5 uncialis bracteis undique tecte, apice florifer.

Bracteæ inflorescenti late ovatæ, apiculam laxe imbricatæ striatæ.

Bracteolæ 2, connatæ, carinatæ spathacea fissa, cuique flora.

Calyx bracteolis duplo longior spathacei-fissus, labio antico dentibus 3-pilosis.

Per. *exterius* connivens appliciter, lacinis oblongis, postico majore.

Inter e labellum, (expans. cordato acuminat.) margines infra basin rolled incumbent over the anther, almost quite concealing it, cæterum subporrect, vel sigmoid. marginibus evolutis, cum anthera præ aliis alte connat.

Filament dilatatum concavum multo venosum ad antheram subgeniculat. Anth. dorso basi gibba, late et breviter emarginatum. Loculi ampla deorsum conniventis, stylum amplectent. marginibus glabris.

Stylus capillaceus, apice dilat. apice dorso convexus.

Stigma with an inconspicuous chink on the anterior border.

Ovarium pubescente pilosum, 3-loculare, loculis angulis interior affixis obscured by spirits, but smaller than general, Placentæ subhastatæ sursum solutæ on *a transverse section.*

Description and drawing from a specimen in spirit.

1. Plant natural size.
2. Flower seen laterally.
3. Ditto dorsally.
4. Labellum spread out and deflexed in front.
5. Ditto laterally.
6. Anther in front.
7. Ditto back.
8. Ovary transverse.
9. Placenta of do. separated.
10. Style head of, back.
11. Do. front, and stigma.

Axi florifera capitato clavato bracteis laxe imbricatis erectis. Per. exterior laciniis longis angustis. Labellum alti-connatum cum filament. cordato acuminato, margin infra medium supra antherum cucullatum, incumbent. cæterum revolutis antheram duplo longiore. Anth. (maximo) marginale margine bicrenulata.

Color. coccineus.

3. *Achasma macrocheilos* Pl. CCCLVII.

Axis floriferis, 4-6 uncialis. Bracteis oblongo-ovatis cuspidatis concavis laxis non adpressis sub 4-fariis, coriaceis striatis fuscescentibus.

Bracteoli 2, 1½ uncialis conduplicato-concavæ, scariosæ cuique flora. Calyx bracteolius ⅓ longior tubum corollæ æquans, spathacei fissus, *labio* 3-dentato, *antico*.

Cor. ringens, per. externum e sepalis 3, lineari-oblongis, conniventibus postico latiore lateralibus solutis, labello suppositis.

Labellum maximum porrectum 3-lobum, lobis lateralibus in filam. cucullato acumbent. marginibus subinvolutis, accedit unguis linearis, marginibus involutis in ungue depressis, ½ uncialis terminatur, lamina brevi linguiforme ad basin bipartito, potius lobo terminali centro crasso carnoso, marginibus undulata inflexis, in partem carnosum arcte incumbent. apice bipartit. lacinia marginibus involutis. Labellum valde venosum cum filam. ultra insertionem sepal. lateratum connat.

Filam liberum mediocre complanatum concavum, vasc. fasc. pluribus. Anthera profunde biloba, lobis divaricatis, loculis angustis, inferne connivent et stigma amplectent, valvis inæqual. utraque secus lineam commissuræ dense breviterque barbata. Pollen globos. album, læve, outer coat quite hyaline.

Stylus filiformis parce pilosus apice dilatatum in leaving the anther about its middle, stigma rima hians in margine anteriori paucis dilatata.

Apex if viewed from above triangular 3rd, angle posticous, stigma occupying the place between the two inferior or lateral angles.

Ovarium compressum 3-loculare, placentis vix centro mutuo adnatis facile solubilibus in sectionem transversem late sagittate oo. placentis, parte, exterior insertis.

1. Plant natural size.
2. Bud.
3. Lateral of flower.

4. Same. Bracteolæ removed, and segments of the inner perianth deflexed.
5. Same viewed vertically and dorsally.
6. Labellum spread out, and deflexed anther and stigma.
7. Lateral view of anther etc.
8. Dorsal do.
9. Transverse view of anther, shews its vascular fascicle.

9*a*. Transverse of filament.

10. Pollen.
11. Posticous of staminoidia.

11*a*. Anticous shewn to be distinct.

12. Transverse of ovarium.
13. Front of apex of style, and stigma.
14. Vertical of apex of style.
15. Placenta separate.
16. Ovulum.

Hab. Malacca Ayer Punnus ad margines viæ in sylvis densis.

Æstivat. perianth exterioris imbricata, labellum ante general expansion longe porrect, arcuatum ascendens color. florum viride coccineo sanguinea.

Obs. Of the affinity of this with Stenochasma there can be little doubt, yet if the anthers were our guide to the exclusion of other signs, it could scarcely be a congener.

Minor differences exist in the solution of the placenta, and the structure of the lip, and apex of the style, and this not being embraced by the whole anther.

To this section or genus will belong Alpinia elatior of Jack, which is at once known, by the flowers being crowded on a densely bracteate capitulis forming to the stalk a nearly hæmisphærical head, by the rosy petaloid bracts, the outer ones of which are spreading or even reflexed.

It is besides abundantly distinguished by the size and structure of the flowers.

STENOCHASMA.

The habit of this genus is more peculiar than that of Achasma.

Specific marks of distinction, may be readily drawn from the flower, this is at once likewise distinguished by the beautiful reticulate urceolate bractes, and the habit of all is the same.

1. *Stenochasma urceolare* Gr. Pl. CCCLVIII.

This species at first looks something like Hydnora.

Elongato-urceolata.* Axis florigera spithamæa, bracteis s ubbifariis imbricatis arcte cincta.

Bracteæ semi-amplexicaulæ, adpressis summis exceptis, lineis lineolisve elevatis albis pulcherrime reticulatis inferiores brunneo-fusco, superiores, atro-fusco, summis brunneo-coccineis e reticulatis, margine reflexis.

Bracteæ florigeræ urceolo inclusæ intimæ demissio res oblonge amplæ membranaceæ albæ, apicibus sanguineis margine eroso denticulato. Bracteolæ 1-2 laterales conduplicato carinatæ calyce paullo breviores

Ovarium complanatum. Calyx compresso-infundibuliform 1½ uncialis membranaceis, venis primariis 3, celluloso-incrase satis costiformibus, ore irregulariter 3-partito, margins of leaves ciliated.

Flos. 4½ uncialis, viride coccineis. Tubo infundibuliform 3-unciali leniter curvato calyce fere duplo longiore.

Per. exterius, 3-partitum, laciniis subuncialibus oblongis concavis margine incurvo, involutis postico apice subcuculato, anticæ 2, medium paullo ultra, cum labello connatis, suppositis bilabiatis, labiis oblique ascendentibus leniter hiantibus.

Per. interius ad labellum reduct. labellum lacinear. 2 lateralibus, per. exterioris longitudine æquant, et his conformia,

* The urceolus looked into, represents a beautiful rosette.

sed margines a medium infra multo magis evolute, accumbenti induplicato ciliolati antheræ medium infernis arcte amplectantur, when spread out appears 3 lobed, the central lobe linguiform.

Anthera labelli intus pilosum supposite, longitudine viride coccinea, in shape much like a spoon-bills beak, filament, dilatatum, præsertim ad bases loculorum qua etiam intus bigibbo-carnosum apice integro oblongo rotundata concaviuscule ultra loculos product.

Loculi angusti dense pallide ferrugineo-pilosi.

Stylus cylindraceus gracilis apicem versus villosus, imo apice dilatatus subinfundibuliforme villoso. Stigma terminaliter hians, vasc. fasc. 3.

Pollen farinaceum album læve staminodia longa, alte connate, circa styli partem basilare convolute. Ovar. 3-loculare, loculis multo ovulat.

Fruct (junior) oblongus leviter compressus calyce integro connivent immulato longe terminal. Semina plurima entirely filling the cells.

Bracteæ extimæ reticulatæ coriaceæ odor contus more solito aromat. inter flores mucilago ad est.

Caules foliiferæ robustæ præallæ 10, 12 pedalis, vaginis longis albo trabeculatis, ligula oblonga integra, fol. (petiole breviss.) lamina longissime 3-3½ pedalis oblongo lanceolatis venis secondariis supra prominulis aliis minus distinctis crebris interjectis subtus molliter sericeo pilosa.

1. Plant natural size.
2. Flower ditto.
3. Limb of flower dorsally.
4. Ditto ventrally, (anticously.)
5. Lateral view of ditto, 2 lateral segments of the inner perianth separated from their adhesion with the labellum, and deflexed.
6. All segments of ext. perianth deflexed, and labellum viewed dorsally.

7. Labellum bent down by force, its incumbent incurved margins spread out, the anther and at *a the stigma.*
8. Staminoidia and part of style, posticously.
8*a*. (Right hand) do. seen anticously shews they are connate high up.
9. Transverse section of limb of flower.
9*a*. Partium situs et alternation.
10. Pollen.
11. Transverse of ovary, most of the ovula removed.
12. Apex of style and stigma.
13. Ovulum.
14. Young fruit terminated by the calyx.
15. Transverse of base of style, and staminodia shews, the angles of the stigmatic canal.
16. Transverse of anther, to shew its vascular bundles.
17. Transverse of filaments.

HAB. Malacca near Ching in sylvis densis.

2. *Stenochasma convoluta* Gr. Pl. CCCLIX.

Axis florifera subulato-cylindracea, bracteis laxis erectis oblongis brunneis vel brunneo-viridib.

Bracteolæ 2 connatæ spathaceo fissæ, *labio postico!* tubo corollæ ⅓ breviores, cum calyce puberulæ.

Cal. longitudine tubo corollæ spathaceo-fissæ, *labio postico!* dentibus 2, oblongis majusculis laxus cylindraceo-infundibuliform.

Per. tubo subclavato leviter arcuato trisulcato, sulcis lateral basi fere attingent, *antico* medium versus evanido.

Per. exterius, 3-partitum laciniæ postica majore oblongo obtusissim. sub-slipper-shaped, marginibus incurvis basi decurrentibus, lateral ascendentibus obtusissimis in sinuum laciniæ posticæ hæc omnino fere obtectæ utraque in cylindricum convolutæ basi obsoleti decurrent.

Labellum porrectum longitudine antheræ, sub 3-lobum, lobis lateral. anther. supra cuculiatis leviter incumbent. termi-

nal. integro calceolariform. supero lobo subascendente, when spread out, *triangular hastate* cum columna supra insertionem perianth. exterioris breviter connat. venos.

Filam dilat. marginibus incrassatis subinvolutis, longissime, plurivenos, vasc. fasc. in connect. connat. 2 lateral majoribus. Anthera oblonga apicem versus attenuata processus emarginatus, anth. locul. dorso annectens. Loculis villosissimis pilibifariis, exter. brevibus, inter. longis hispidis.

Stylus filiformis, apice dilatatus, geniculatum vertice depresso deflexo, stigma hians in marginem anterior ciliatum stylus crassiusculus.

Pollen globosum.

Hab. Malacca in sylvis densis at Rhim.

Char. spec.

Scapo subulato cylindraceo, bracteis decoloratis striatis laxis. Per. exteriores lacinia basi decurrente, margine involuto, lateralibus cylindreo-convolutis suppositis obtegente labello ambitu trigono hastato filamento longissimo. Anther, apice emarginata, loculis (bifaria) villosissimis, basi productis discretis.

Gastrochilus.

Gastrochilus.

Rhizomata: foliis longe petiolatis sæpius 4, petiolis medium vaginantibus, vaginis rubris profunde sulcatis, ligulis oblique 2-lobis, foliis inferior ovata, superioribus ovato-lanceolatis vel lanceolatis, basi oblique cordatis acutis repandis venis superne prominulis inferioribus subus purpurascentib. Spica centrali terminalique secunda.

Peduncula flexuosa bractea lanceolata acuta 1½ uncialis ad basin cujusque floris, florib. magnis, nutantibus albidis, labello rubro-maculata.

Cal. tubo brevi, limbo truncato subintegro,

Cor. tubus longiss. calyce 4-plo longior 3-petala, petalis linearibus obtusis subæqualib.

Labellum filam. adnatum subcucullatum calceolariform subrepando.

Filam 3-lobata, lobis lateralib. cuneato-obcordatis petaloideis tenuissimis, dente medio filiforme antherifera.

Filam. ultra antheram non elongat. connectivo carnosum, apice emarginatum, anth. linearis.

Stylus sulco filam. receptius. Corpora hypogyna 2. Stigma cyathiformia. Ovar. 1-locule ? placente parietale ovula pauce erecta, arillo laciniato. Filam. conductor porrecto. Ovar. adnatum, ad placentam currens. Placenta basilaris brevis parietis adnatis.

Hab. Mergue. In sylvis, humidis confer *Kæmpferia pandurata* Roxb. Bot. Reg. 2 fol. 173. Mergue Herb. 141. *August* 1834.

This is a truly caulescent Scitaminea.

Globba.

1. *Globba.*

Glabra caulibus teritibus, vaginis glabris, brunneo-maculatis, ligula inæqualiter bifida, foliis elongato-lanceolatis subcaudatis repandis supra nitidis ad venas pilosis, infra pallidis. Racemo pauciflora, floribus plerumque 2 in cuique pedicello. Gemmis bulbiformib. ut in aliis.

Accedit. No. 58, sed statura multo minor. floribusque paucis differt.

Hab. In sylvis, *Madamaca* : *August*, 1834.

2. *Globba.*

Hispidissima caulibus compressis vaginis *exsertis* hispidissimis, foliis lanceolatis repandis, utrinque pilis mollibus tectis acuminato-caudatis.

Paniculis racemosis nutantibus, pedicellis calycibusque bracteis ovariisque purpureis, calcaribusque anthera longior. Corolla lutea, filam. pallidius.

Hab. Mergue. In sylvas ad littoram *Madamacam* : *August*, 1834. Filam. post anthesin spiral. fit. Mergue Herb. 57.

3. *Globba.*

Caulibus teretibus petiolis longe vaginantibus, pubescentibus, ligula bifida purpurascente, foliis oblongo-lanceolatis acuminatis, repandis subtus ad nervum pilosis tactu mollia. Panicula terminalia racemosa, perianthio luteo.

Variat, foliis utrinque pubescentibus, caulibus brunneo-purpureo magis tinctis, calycibus fuscescentibus.

Hab. Mergui In sylvis *Madamaca* : *July*, *August*, 1834.

Paniculæ basin versus, gemmæ bulbiformes sessiles vel pedicellatæ, aggregatæ, bracteatæ.

END OF PART III.

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